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...TRICAL REVIEW, AUGUST 20TH, 1943
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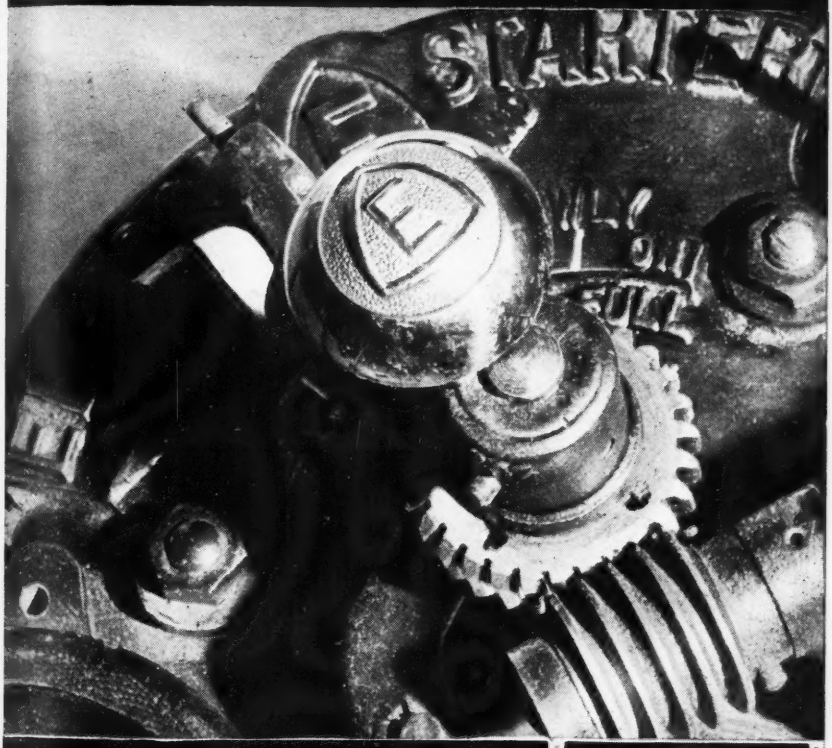
RURAL DEVELOPMENT

ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXIII. No. 3430 AUGUST 20, 1943 6d. WEEKLY

Pattern of Industry: Documentary of work in progress No. 8



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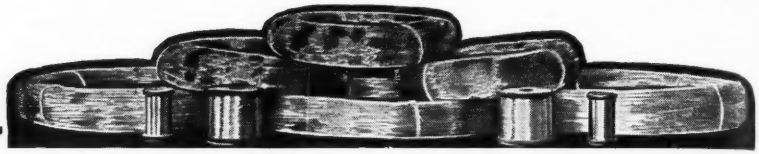

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ELECTRICAL REVIEW

August 20, 1943

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Contents :—

	Page
Editorial—Wayleave Considerations	225
Rural Development—I	227
Plan for London. By E. H. Jesty, A.M.I.E.E.	230
Wayleave Compensations. By F. T. Billingsley	232
Motor Economies. By "Designer"	234
Current Transformers. By H. E. Forrest	235
South Shields Case	237
Radio Standards in America	238
Correspondence	239
Personal and Social	241
Commerce and Industry	242

Contents continued :—

	Page
Low-Voltage Circuit-Breaker	245
Wind Power	246
Farm Grinding Equipment	247
War-Damaged Premises. By F. E. Sugden, A.C.I.S., Barrister-at-Law	248
Electricity Supply	249
Imports of Iraq	250
Financial Section	251
New Patents	256
Contract Information	257
Classified Advertisements	61
Index to Advertisers	72

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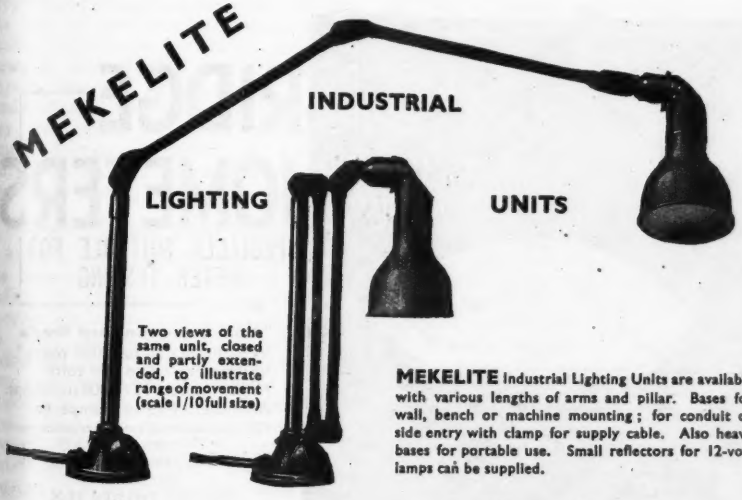

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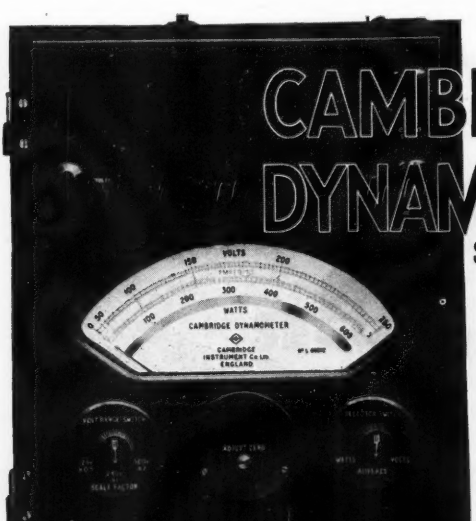

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIII. No. 3430. AUGUST 20, 1943 6d. WEEKLY

Wayleave Considerations

Officers' Duties and Form of Agreement

EASEMENTS for the construction of overhead lines across private property are, in general, obtained with less trouble than they were before the benefits from a more extensive use of electricity came to be appreciated by owners and occupiers of land. On the other hand, in view of the far greater proportion of the lines that is required for supplying small loads at the lower voltages, the cost of obtaining wayleaves and of making deviations to meet individual views is becoming a considerable and growing financial liability. When arable land is crossed, Mr. P. Rycroft has pointed out, the capitalised value of wayleave rentals (which constitute, in effect, a perpetual royalty) may increase the overall cost of the line by as much as 25 per cent.

Forethought and Local Knowledge

As rural electrification increases, so do the responsibilities of wayleave officers. Before the Minister of Transport will approve the erection of an overhead line, he must be satisfied that the local authorities and other interests concerned have no objections to raise, and the preliminary steps must be taken by the undertaking. In order to remove serious grounds of opposition, a great deal of forethought and local knowledge is required of a wayleave officer with regard to such matters as safeguarding amenities, providing for possible future building developments, avoiding damage to crops and minimising tree and hedge cutting.

Many difficulties can be got over if in the preliminary survey a note is made of reasonable wishes of landowners and their tenants and of the various ways in which constructional and subsequent maintenance work can be carried out with the least disturbance. Afterwards great care is necessary in drawing up the wayleave agreement to ensure that it is based on accurate information, so as to preclude any risk of trespass and unexpected claims for compensation later.

Advice to Prospective Consumers

Such work does not delimit the duties of the responsible official by any means. He is often the first representative of the undertaking to come into contact with members of the public. For that reason, Captain F. T. Billingsley, who writes in this issue, holds that he should be an engineer qualified to advise prospective consumers on matters relating to the use of electricity, including the cost of tapping a high-voltage line for individual supplies, the costs of and power required for running various types of appliances and uses to which electricity can be put.

If a wayleave officer finds himself able to shoulder this duty, it would no doubt smooth his way, since it annoys people to be bandied from one department to another. Any discussions of this kind should, however, be on broad lines and firm figures should be quoted only by the consumers' department, a representative of which would accompany the wayleave engineer. The latter should certainly have access to the heads of all depart-

ments concerned with a view to lightening his labours. Probably these would be less onerous if landlords were not so often dissatisfied, as Captain Billingsley has found them to be, at the wide discrepancy between the rentals and conditions obtaining in respect of their properties in different localities. Although in some parts of the country there has been some agreement as to terms and conditions, this does not go far enough to meet his point that there should be a standard form of wayleave agreement with specified rentals for the whole country.

Plastic-Insulated Cables

To meet the shortage of materials normally used in cable manufacture it has been necessary to introduce as substitutes thermoplastic materials, principally polyvinyl chloride compounds. It appears that there has been a tendency to assume that cables embodying this form of insulation may be used without hesitation for any purpose in place of rubber-insulated cables. In a letter published in this issue Mr. W. A. Bishop, the chairman of the Cablemakers' Planning Committee, draws attention to the limitations of these cables and offers advice to purchasers who are considering their use in arduous or unfavourable situations. The Planning Committee and the Cablemakers' (War Emergency) Technical Committee advise Government Departments in all matters associated with wartime cable production.

Post-war International Trade

OPTIMISTIC views regarding post-war trade conditions are held by Mr. Eric Johnston, president of the American Chamber of Commerce, who is on a visit to this country. He says that there is more fear regarding the future in this country than in America. That fear was baseless, for there would be a dynamic expanding economy, not a contracting or restrictive one. There would be a tremendous demand for machinery and equipment throughout the world and Great Britain would be able to compete successfully in that market. Artificial barriers to world trade would be lowered as time went on; the aim of America was to work gradually towards lower tariffs. Mr. Johnston considered that assistance to countries wishing to industrialise themselves would not have a harmful effect upon older industrial nations, for with increased purchasing power trade always flowed most freely between highly industrialised countries.

Reorganisation in London

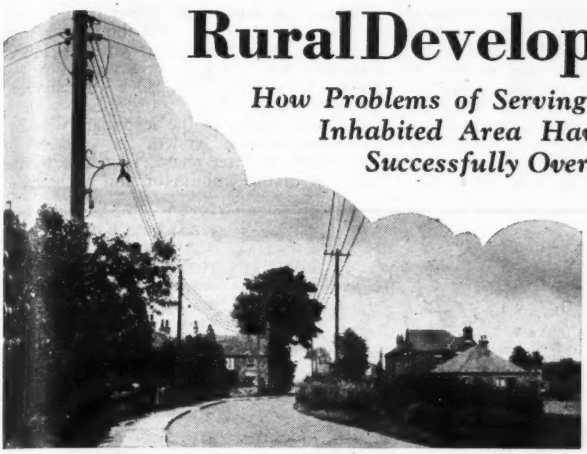
MR. E. H. JESTY, who has an intimate knowledge of electricity supply in London, puts forward in this issue a number of proposals for co-ordinating the activities of the more than twenty authorities operating in the inner London area. He suggests eight groups of which three are purely municipal, two comprise companies only while the other three are "mixed." A number of the undertakings are already connected in some way or another which enables the author to provide a sound basis for his proposals. It will be observed that the grouping does not interfere with the existing scheme by which the London J.E.A. is to take over the London companies in 1971.

The Broad View

FOR many years now there have been electrical manufacturers whose considered policy it has been to train young engineers for superior positions without seeking to tie them to any particular employers. That this course may benefit trade rivals is regarded as of little moment compared with the indirect rewards that come from the good done to the industry as a whole. This outlook has not yet been developed to the same extent in electricity supply, although trade competition is absent, and it is to be hoped that the suggestion advanced by Alderman W. Walker in our Correspondence section this week will be followed up.

Electrical Ironmongers

DURING the past few years the hardware trade has become more and more interested in electrical equipment. In a recent study of post-war prospects, the *Ironmonger* considers that the electrical side of the ironmongers' business will expand "particularly if imports, which include kerosene, have to be cut to the minimum." It goes on to say that "the ironmonger would lose business in oil, oil stoves, lamps and sundries, but the all-round development of the electrical demand could be made to compensate for this. Within a few years most houses might have an electric refrigerator, clothes dryer, toaster, hair dryer, and razor."



Rural Development—I

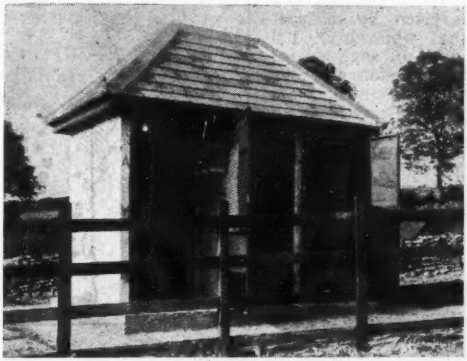
How Problems of Serving a Sparsely Inhabited Area Have Been Successfully Overcome

SOME people, among them members of the Scott Committee, apparently have not a very high opinion of the capability and initiative of the electricity supply industry, as at present constituted to handle the problem of making electricity available in rural areas. No doubt this is due mainly to lack of knowledge of what has already been achieved and what would have been undertaken had not the war put a stop to development. There may, however, be an undercurrent of politics, based on the view held widely to-day that anything that is run by private enterprise must *ipso facto* be bad, but there can be no disputing the fact that it is private enterprise that has been principally responsible for the very substantial progress that has already been made in furnishing supplies of electricity to sparsely inhabited districts which offer little in the way of financial return.

It is therefore interesting and enlightening to study the remarkable progress that has been made in a very short period of time by a company undertaking operating entirely on its own initiative without any assistance, financial or otherwise, from the Government. Before proceeding further we should like to make it clear that the undertaking we have chosen to describe, though a good example, is by no means unique and may be said to typify the work of many undertakings to be found all over the country.

Although it commenced operations only ten years ago, the North Lincolnshire & Howdenshire Electricity Co., Ltd., which is associated with the Yorkshire Electric Power Co., has already brought the advantages of electricity to 104 (60 per cent.) of the 173 parishes in its 771-sq.-mile area and to-day it supplies 10,928 (40 per cent.) of the total number of premises in the area. Furthermore, but for the war the company's development programme would by this time have enabled electricity to be supplied to a number of villages not at present served.

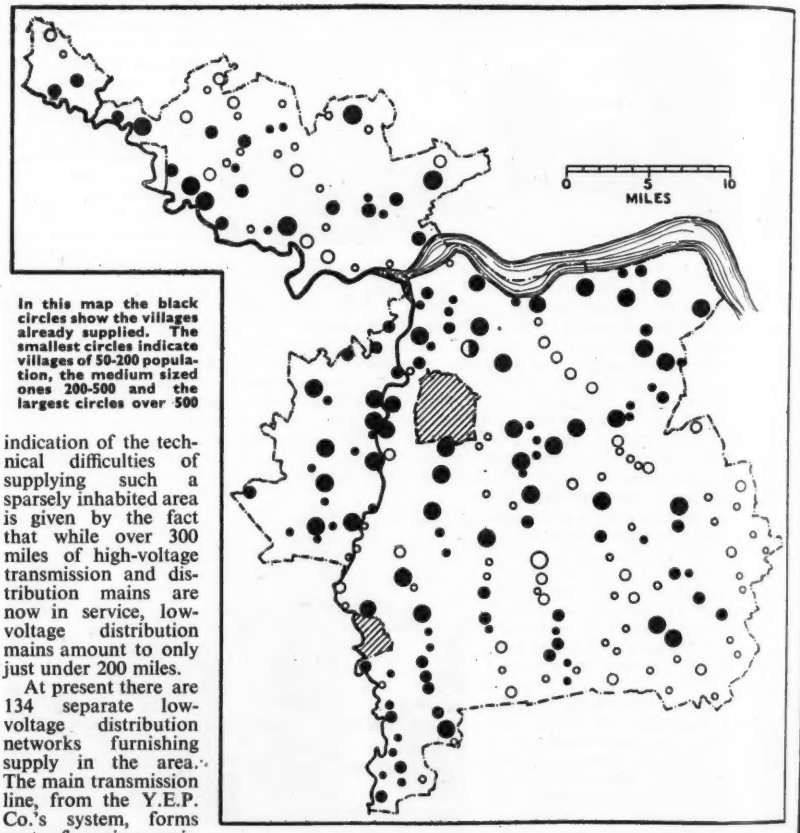
The remarkable degree to which the undertaking has succeeded, in such a comparatively short while, in extending its operations throughout its area, is perhaps best appreciated by reference to the map. It will probably surprise many to notice not only what a large number of villages in the 50-200 population category are already served, but also that there are no towns of any considerable size in the company's area to help to balance things up. Scunthorpe, which incidentally has a population more than half as large as that of the whole of the company's area, is separately supplied.



Concrete kiosk type substation

The company's achievement is all the more praiseworthy when it is appreciated that there are fewer than 100,000 inhabitants in the whole

area and that the density of population is only 123 per sq. mile, about one sixth of the average for the whole of England and Wales. To put it another way, to supply its 10,500 consumers (13·6 per sq. mile) the company has taken its mains 190 times the distance required to serve consumers in an area such as Leeds, for example, which with a population density of 8,210 per sq. mile has 2,600 consumers per sq. mile. A further



In this map the black circles show the villages already supplied. The smallest circles indicate villages of 50-200 population, the medium sized ones 200-500 and the largest circles over 500

indication of the technical difficulties of supplying such a sparsely inhabited area is given by the fact that while over 300 miles of high-voltage transmission and distribution mains are now in service, low-voltage distribution mains amount to only just under 200 miles.

At present there are 134 separate low-voltage distribution networks furnishing supply in the area. The main transmission line, from the Y.E.P. Co.'s system, forms part of a ring main with connections to the interconnected transmission system of the parent company in the adjacent area. A portion of this ring main operates at 66 kV and the remainder at 33 kV, and there are spur lines also operating at the latter voltage. From main distribution substations at various points on the ring main, 11-kV distribution mains are run to cover the proportion of the whole area already referred to.

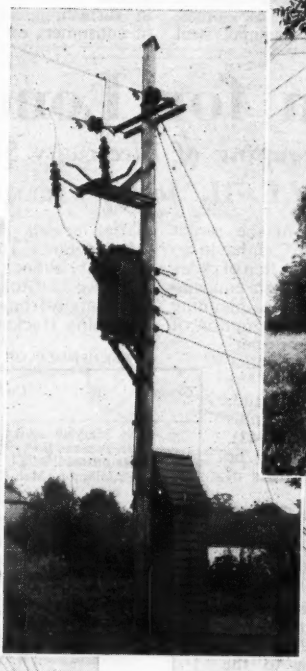
Where the demand or power requirements justify, the normal distribution system consists of three-phase, four-wire, 400/230 V. Extensive use is made, however, of single-phase, three-wire, 460/230-V distribution, using a single-phase transformer with a mid-point tapping in the secondary winding. This single-phase system is capable of conversion to three-phase, four-wire by the addition of one conductor and a change of transformer, but in the case of many small villages and hamlets the initial provision of single-phase will probably meet all foreseeable demands.

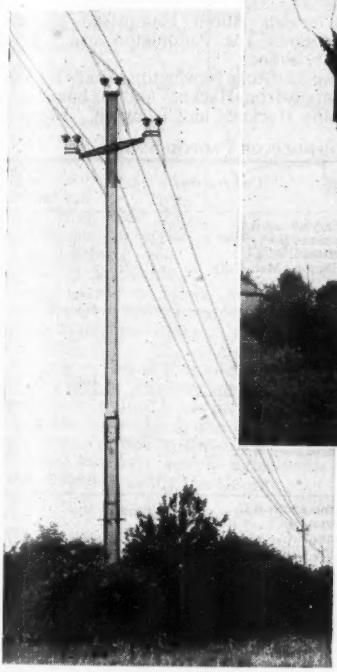
Just before the war certain extensions were proposed in a remote portion of the area, using the "combined" construction in which the high- and low-voltage mains are carried on the same supports operating single-phase with one side earthed, but these

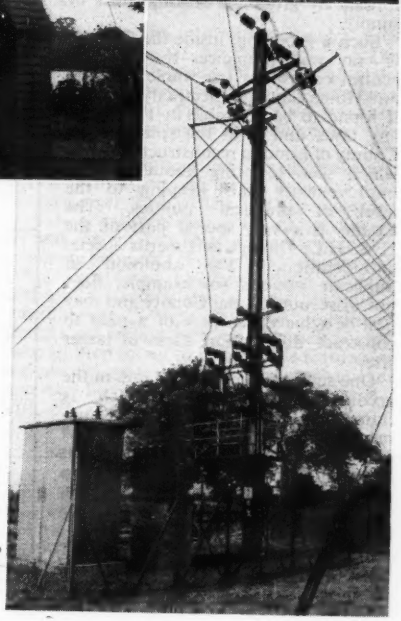
schemes have had to be deferred for the time being.

The 66-kV and 33-kV transmission lines are generally supported on steel masts designed and developed by the Yorkshire Electric Power Co. They are fabricated from bulb angles and plates, the earlier and heavy type being riveted and later types welded together. They are particularly suitable where normal spans of, say, 500 ft. are practicable, since they occupy a very small ground area and are almost completely fabricated in the shops. For the majority of rural work the company uses wooden poles, but on a few of the important and

Right: 11-kV, three-phase main distribution terminal pole at an underground section, with a 10-kVA, 10,000/230-V pole transformer with fuse protection
Below: 50-kVA, 11,000/460/230-V pole transformer protected by fuses. The wooden cabinet contains l.v. control switchgear, meters, time switches







Above: 33-kV, three-phase transmission line on welded steel masts and with bridle guarding over public road
Right: Outdoor substation with 200-kVA, 33/11-kV transformer protected by fuses and connections to a steel kiosk containing isolators and fuses for controlling two outgoing 11-kV feeders

heavy 11-kV lines welded steel masts of a lighter type than those used for main transmission lines have been employed. Pole transformer equipments are extensively used, 187 being in service as compared with 48 substations. The substations, by the way, are mostly of concrete slab construction, specially designed for rapid assembly. Sectionalising of overhead networks is provided by ground-operated air-break switches or by links enclosed in small steel cases. On long distributors, pending development sufficient to justify an additional high-voltage feed, pole-mounted regulators and/or balancers have been used for the maintenance of voltage regulation. Special precautions have to be taken against lightning which is especially prevalent in this district.

It is proposed to describe in a second article how the company has succeeded in furnishing supplies to different classes of consumers on attractive terms.

Plan for London

Suggested Grouping of Electricity Supply Areas

By E. H. Jesty, A.M.I.E.E.

THE favourable reception of the recent "County of London Plan" is due in no small measure to its presentation of clear-cut proposals instead of being a mere enunciation of desirable reforms. Central planning has been designed without the disruption of the existing structure of private ownership and municipal interest. Similar measures might be appropriate to the electricity distribution problem, and, as pointed out by Mr. Hamlyn Dennis (*Electrical Review*, July 30th, 1943), distribution areas can conveniently be formed by grouping existing areas of supply.

Such a grouping, inside the County, in no way prejudices the ultimate central control of the whole London and Home Counties Electricity District, if found to be desirable in 1971 or at any time, and is in the spirit of the County of London reconstruction plans which seek to bring about overdue improvements whilst keeping to the level of practical politics. The County is a very special part of the L. & H.C. District and merits special consideration. The abolition of duplicate powers, for example, does not arise outside the County and may best be achieved as part of a plan to construct distribution areas of larger size.

One such possibility is set out in the accompanying schedule, which is framed with regard to certain recommendations of the McGowan Report and in the light of existing associations and alliances and is illustrated by a map showing the proposed grouping.

In this schedule the following facts have been taken into consideration:

Group 1.—Hampstead already receives a bulk supply from St. Marylebone. St. Pancras has boundaries which adjoin Hampstead and St. Marylebone. The Paddington area adjoins St. Marylebone.

Group 2.—Stoke Newington already receives bulk supply from Hackney and has boundaries adjoining Hackney and Islington. Islington

SCHEDULE OF PROPOSED GROUPS

Group	*Undertakings*	*Present Area sq. miles*
1	St. Marylebone B.C.	2·3
	St. Pancras B.C.	4·0
	Hampstead B.C.	3·5
	Paddington (Met. Co.)	2·0
	Total	11·8
2	Hackney B.C.	5·25
	Islington B.C.	4·75
	Stoke Newington B.C.	1·0
	Total	11·0
3	Stepney B.C.	2·75
	Poplar B.C.	3·5
	Shoreditch B.C.	1·0
	Bethnal Green B.C.	1·15
	Total	8·4
4	Hammersmith B.C.	3·5
	Battersea B.C.	3·5
	Fulham B.C.	2·6
	Notting Hill Co.	2·5
	Total	12·1
5	Central London Electricity	
	Metropolitan Co. (Central Area)	
	County Co. (Holborn & Finsbury)	
	City Co. (City Area)	
	Total	8·25
6	London Electric Supply Corpn.	
	County Co.(Southwark & North Camberwell)	
	City Co. (Southwark)	
	Southwark B.C.	
	Bermondsey B.C.	
	Total	9·26
7	County Co. (Wandsworth)	
	South London Co.	
	County Co. (Camberwell South)	
	South Metropolitan Co.	
	Total	42·0
8	Woolwich B.C.	13·0

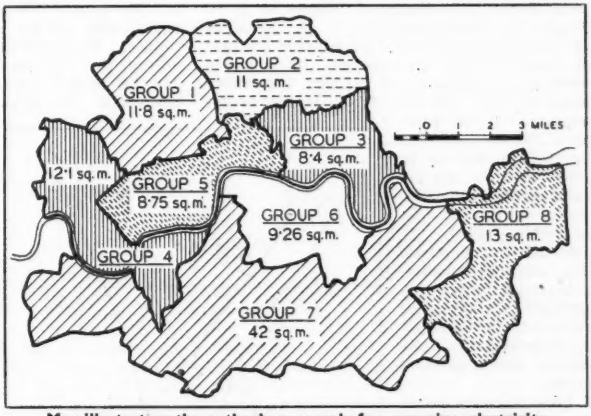
has a bulk supply agreement with the London J.E.A.

Group 3.—Bethnal Green receives bulk supply from Stepney. Both of these boroughs are flanked by Shoreditch and Poplar.

Group 4.—Hammersmith, Fulham and Battersea have agreements for mutual assistance. Hammersmith has a bulk supply agreement with the London J.E.A. The Notting Hill Co. supplies a part of Kensington which adjoins Hammersmith on the whole of its western boundary.

Group 5.—No municipal undertakings are involved, but duplicate powers exist over a large part of the area which it is geographically convenient to consider as a unit.

Group 6.—The City Co. supplies in bulk to Southwark. The London E.S. Corporation supplies in bulk to Bermondsey. Duplicate powers exist in Southwark, Bermondsey and North Camberwell. This group may be the most difficult to crystallise, although geographically justifiable.



Map illustrating the author's proposals for grouping electricity supply undertakings in the County of London

Group 7.—Associated working already exists between the companies in this group, and no municipal undertakings are included in the area.

Group 8.—This one municipal undertaking has been left to form an internal County of London group since it has no electrical liaison with other boroughs in the County, is large and diverse enough to constitute a "group" area, and has bulk supply agreements with urban districts outside the County.

Central Authority

The existence of a central planning authority (*e.g.*, a strengthened Electricity Commission) does not make a common form of ownership imperative, provided that it has sufficient powers, and commands enough respect to co-ordinate by its decisions matters relating to technical development and commercial policy.

Municipal undertakings usually view with extreme disfavour any projected loss of identity, and it might be possible to preserve these identities for showroom and public relations purposes, even within the framework of the group.

If, however, it should ever be generally accepted that common ownership is desirable, or expedient, then the London Passenger Transport Board presents the closest analogy for study. It is stated that the chief aim of the L.P.T.B. is "to impose a central point of view on the undertakings in its area and to deal with the problem of operating them as a single problem." This should also be the aim of any Electricity Distribution Board.

Distribution, like passenger transport in the London area before its co-ordination, is effected by a multiplicity of public and private concerns entering into direct contact with large numbers of "consumers." The extremely intricate problems of compensation to displaced proprietors and staff have been met with by the L.P.T.B. and their solutions could provide valuable experience in this direction.

Even the vexed question of tariffs has many points of similarity with that of fares and rates for passenger travel. The L.P.T.B. does not provide a uniform charge for its services to all and sundry, but finds it necessary to discriminate between "classes" of "consumer." Workmen's fares, children's fares, evening and all-day tickets, special rates for parties travelling at "off-peak" times, minimum charges on certain sections of coach routes, have all been found to be desirable features of commercial operation. Even the season ticket rate may be regarded as a "two-part tariff" with zero "unit" charge.

Floating Power Plants

The United States is shortly to commission four floating power plants, each capable of supplying a town of 150,000 people with electricity, states *Reuter*. They are designed for use on inland waterways and will cost a total of £3,230,000.

Wayleave Compensations

Assessment of Damage during Construction and Maintenance

By F. T. Billingsley
(Wayleave Officer, West Midlands J.E.A.)

NO matter how carefully a line is set out it is always necessary to fell some trees, and a wayleave engineer must have a good general knowledge of botany so as to be able to discuss intelligently the value of timber and agree upon a reasonable amount of compensation. Commonly he offers a nominal sum of £1 or so per tree, the timber being left for the owner, or, if the owner requires it, a price per cubic foot. Often the timber has to be paid for at market value (now controlled under S.R. & O. 1939 No. 1216). In my experience there has been a considerable hardening lately amongst owners and agents, who usually insist nowadays on receiving the controlled price.

This price is somewhat high in view of the usual requirement that the timber shall be removed from the field, and since only single trees are usually concerned removal charges may be excessive.

The cubic content of a standing tree can best be obtained with the aid of Hoppus's Measurement Tables, taking the quarter girth (G) in inches and the height (H) in feet and using a special girthing tape. For the tree shown in fig. 1 the particulars are:—

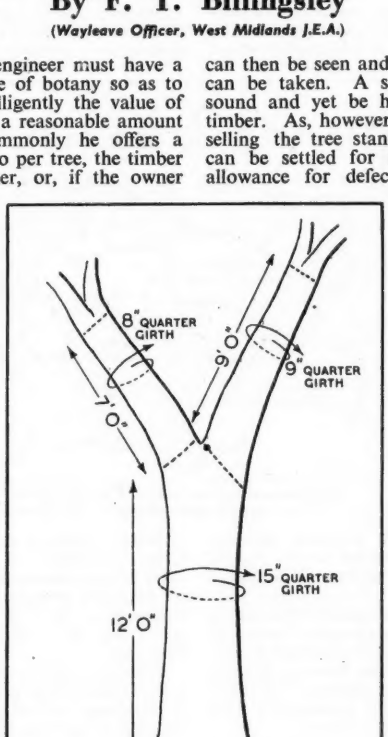


Fig. 1.—Ascertaining cubic content of tree

	H	G	cu. ft.	in.	pts.
(a)	12	× 15 =	18	9	0
(b)	9	× 9 =	5	0	9
(c)	9	× 9 =	3	1	4
			26	11	1

Rounding this off to 27 cu. ft. the value at 1s. 6d. per ft. is £2 0s. 6d. plus allowance for top, 5s., making a total of £2 5s. 6d. From this figure should be deducted a bark allowance of from 7½ to 15 per cent. depending upon the species of tree, as provided in S.R. & O. No. 1216.

To value a tree after it has been felled is a more satisfactory way, as all defects can then be seen and accurate measurements can be taken. A standing tree may look sound and yet be hollow and valueless as timber. As, however, some owners insist on selling the tree standing, a price per foot can be settled for sound timber with an allowance for defects if possible. Usual signs of defects are:—Fungus growths, which always denote decay; holes where water may have lodged and started decay, when almost certainly the rot will have travelled into the centre of the tree; large cracks appearing through the whole length of the trunk indicating "wind shatter" which, if bad, renders the timber useless.

That is not the end of the undertaking's responsibility in this respect, however. More often than not timber merchants are reluctant to purchase scattered trees owing to the cost of removal, which is as high for one tree as for several (about 300 cu. ft. is considered a fair load). Therefore, one is often faced with the task of moving a tree weighing several tons across soft ground with little or no tackle. Several pounds' worth of damage may be done to crops if an attempt is made to move the tree whole.

The following method was introduced by myself many years ago and a large number of big trees have since been handled with a 30-cwt. lorry. A portable power-saw with slabbing attachment was purchased and a 36-in. circular saw installed at the main stores. The portable saw is taken to site after felling; it could be used for actual felling, but I prefer axemen, as in my opinion much more control is obtained, and a tree can be dropped by good men to any position required. The

main butt is then slabbed up into 6-, 8- or 10-in. slabs of whatever length is most useful (almost any length can be obtained according to length of butt).

These slabs can be handled by four men and transported by a small lorry to stores, where they are sawn up for gate posts, rails and posts for fencing, kicking boards, windage and bracing baulks, heavy posts for fixing against stays to eliminate trouble due to cattle rubbing and other purposes of the undertaking. The cost of this compares very favourably with buying timber, and gets the trees off the fields. The working of the equipment is simple and can be carried out by ordinary wood-fellers.

As the engineer in charge of wayleaves arranges with the owner for the felling of certain trees when the line is erected, he knows their requirements and should be in charge of the men working on tree-cutting maintenance. Some owners insist on being present when the trees are cut, and very few will give permission to lop trees whenever required without reference to them. This arrangement also makes it possible to retain some trained men regularly, which is a great advantage where many miles of line are in commission, involving the periodic lopping of thousands of trees, a large number of them ornamental and requiring great care.

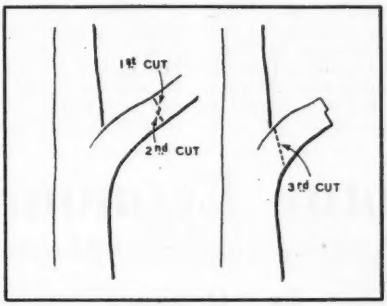


Fig. 2.—Tree cutting and lopping

Overhead linesmen patrolling the route report all trees which in their opinion have become dangerous to the supply. There is divided opinion as to the clearance considered safe, but in my opinion 12 ft. is reasonable, although it cannot always be obtained. A great deal depends on the nature of the tree, its position relative to the line, its reaction to heavy wind and excessive ice loading and other considerations which often relate to only one type of tree.

On receiving the report regarding trees that need to be lopped, the wayleave engineer obtains the necessary permissions and passes on instructions to the wood cutters, who should be experienced men and carefully supervised. Due attention should be paid to the proper season for cutting, but this is not always feasible. Wherever cutting has taken place treatment should be applied to prevent permanent damage. In fig. 2 is shown a method of removing a heavy limb. Two cuts are made approximately 1 ft. from the place where it forms the trunk, and a third cut on the side of the shoulder away from the trunk; the exposed surface is then sterilised and covered. The work should be carried out in groups of trees so as to avoid unnecessary transport, but this is not always possible, and a visit may have to be made to carry out comparatively small jobs caused by broken branches due to wind or accident. A good workman will usually know of some other cutting which can be attended to at the same time in the district.

Most agreements incorporate a clause relating to payment of compensation for damage to crops, etc. Usually damage comes under one of the following headings:—Growing crops and land, live-stock, farm implements and fences, etc. Growing crops are usually the subject of claims during the erection of the line, and compensation can generally be agreed between the wayleave engineer and the owner or his agent if a reasonable sum is discussed and common sense used. Sometimes, however, an outside valuer has to be called in. Much damage can be covered by insurance, and care should be taken not to agree to compensation when the claim is the responsibility of an insurance company.

A good method is to determine a basis on which the claim can be settled. A crop of wheat can be damaged by digging holes, walking from end to end of the field, and running a lorry through to deliver poles. Agreement being reached with the owner or his agent as to the area of the damage, an average yield of wheat for that district is taken and a decision reached as to whether the crop is an exceptionally heavy one. (It always is !)

As an instance, let us suppose the average yield of wheat in that district to be twelve bags to the acre, if the crop is fairly heavy, one could agree to (say) fourteen bags. If the area damaged is a seventh of an acre, this gives two bags of wheat at (say) 16s. per bag, plus straw 10s. making a total of £2 2s. 0d. as satisfactory compensation. If the farmer realises that he is getting a square deal he is usually quite reasonable and can easily be approached for further wayleaves.

This method of assessing compensation can be applied to any damage to crops if the wayleave engineer has a good general knowledge of yields for the district and of ruling prices. For damage to or loss of grass, a good basis is so much per head of cattle per day. For instance, a farmer with

a small amount of land may have to take forty head of cattle out of a field because of danger caused by holes which have only been half filled up or on account of line stringing or because a line has broken and is hanging between poles. He may have to put the cattle into a neighbour's field and it is reasonable for him to expect the undertaking to pay the charges he thus incurs.

Growing hedges, gate-posts and post-and-rail or wire fencing are frequently damaged during construction and maintenance of lines. In my opinion the best method is to repair the damage by direct labour and obtain a signed statement from the occupier as to his entire satisfaction. If a new fence at least as good as that damaged is provided very little dissatisfaction will arise.

Fortunately, damage to farm implements is not frequent, as claims on this account can be very heavy. I have experience of claims for mowing and reaping machines which have fouled pegs which were put in carelessly. Little else can be done than express regret for inconvenience and pay for repairs, which often leaves the farmer dissatisfied.

Injury to cattle is a very serious matter. The injury may be to an ordinary animal of average value or to a pedigree stock-producing animal of great value. The best policy is to take all precautions possible, but should an accident occur the fullest information should be obtained immediately and steps taken to see whether it is fully covered by insurance.

Motor Economies

Avoiding Too-Liberal Margins

By "Designer"

WITH a view to exercising the utmost economy in the use of materials it would appear desirable to discard for the time being the findings of the conservative B.S.S. 168/1936 (Electrical Performance of Industrial Electric Motors and Generators with Class A Insulation) or to have it amended in line with present emergency conditions. When a motor is ordered, the horse-power specified is usually in excess of that necessary to an extent that seems to be proportionate to the number of persons dealing with the matter, each of whom adds 5 to 10 per cent. according to his temperament or rounds off the horse-power to some figure considerably above the exact requirements.

The practice in the past has been to play for safety, and machines rated to give a temperature rise of 40 deg. C have often had a temperature rise of only 20 deg., resulting in a waste of material not only in the machine itself but also in the associated wiring and control gear, the sizes of which are directly related to the motor rating plate. Where a considerable number of machines is involved this useless margin also affects the size of the main transformers and switchgear.

Nevertheless, to throw out B.S.S. 168 and re-design machines to have, for example, a temperature rise of 50 instead of 40 deg. C. would cause much extra work in already short-staffed design offices. Moreover, a return will probably be made to B.S.S. requirements after the present emergency.

Advantage can, however, be taken of the conservative nature of the ratings employed in this country through employing the method laid down by the Ministry of Supply; this consists in determining by test the horse-power required, multiplying the result by 0·9 and rounding off the figure to the nearest ½ HP in the case of small machines. For example, if the horse-power from test is 4·0, 90 per cent. of which is 3·6, the motor should be rated at 3½ HP. For a larger drive requiring 26 HP, 90 per cent. of which is 23·4, a 23½-HP motor should be specified with suitable control gear. Probably the manufacturer receiving the inquiry would use his nearest standard frames designed for maximum outputs of 4 HP and 25 HP, which would give a safe margin. In this manner the overload capacity of the machines can be used.

A similar method was worked out by the War Production Board in the United States. No alteration is required in the nameplate rating, which is important if B.S.S. 168 is reverted to after the war or if the machines are then used on different drives. The temperature rise (nominal) of the machines will still be 40 deg. C., but they will be more nearly loaded up to their nameplate ratings.

Where conditions allow, the following preferences will save copper and permit of smaller frame sizes: Ventilated instead of totally enclosed machines; squirrel cage instead of slip-ring machines; high-speed instead of low-speed machines.

Larger motors are usually designed for the required test conditions, but less valuable materials can be used if they are rated to B.S.S. 226, which covers the continuous maximum rating of large electric motors, excluding alternators of the steam-turbine-driven type. For example, Class B insulation will allow a rise of 50 deg. C. with an ambient temperature of 40 deg. instead of the usual 40-deg. rise.

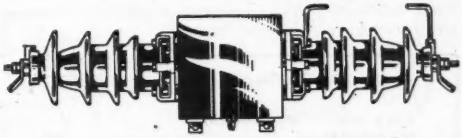
Current Transformers

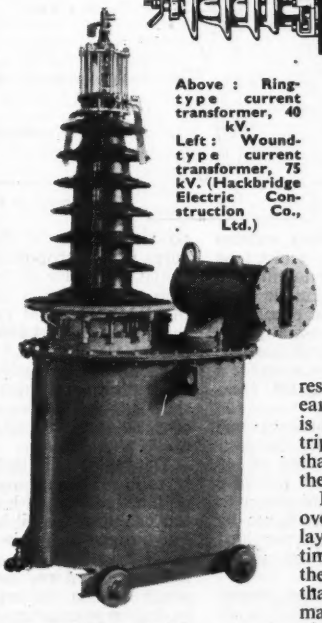
Designs for Robustness and Accuracy

By H. E. Forrest

WHEN connected in power lines current transformers should, wherever possible, be of the single-turn ring primary construction and not of the multi-turn wound-primary type, because the mechanical forces they have to withstand on a heavy short circuit are directly proportional to the number of primary turns. There are occasions, however, when with low values of primary current the desired accuracy is unobtainable with the ring construction and current transformers with wound primaries must be employed, greater care being exercised in their mechanical bracing.

Typical of recent designs of ring transformers is the example illustrated. This is insulated for connection in a 40-kV line and intended to withstand a short-circuit equivalent to 600 MVA. for 2 sec. The unit consists of three separate cores and windings with a common single-turn primary. The ratio of primary to secondary current in each case is 500/5A and the secondary windings are connected in metering, restricted-zone earth - leakage-protection and overload-protection circuits.





Above : Ring-type current transformer, 40 kV. Left : Wound-type current transformer, 75 kV. (Hackbridge Electric Construction Co., Ltd.)

The metering secondary is capable of an output of 20 VA with Class A.M. accuracy, which is obtained, without any winding compensation, by using a core of specially selected "Mumetal." The use of this material, which has low magnetisation loss characteristics, gives extremely small ratio and phase-angle errors. In addition, since " Mumetal " is saturated at low values of flux density, the instruments connected in the secondary circuit are protected against excessive currents during short-circuit and fault conditions.

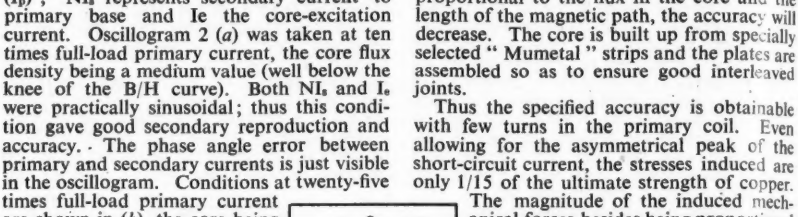
The restricted-zone earth-leakage secondary is one of a set of four, one for each phase and neutral of the 40-kV star side of a 35,000-kVA power transformer. The system is protected against earth faults in the restricted zone comprising the power transformer, its associated current transformers and pilot leads. In this instance the relays are required to operate instantaneously should an earth fault of a magnitude approximately equal to 20 per cent. of normal full-load current occur in the protected zone. In addition, however, the system must be unaffected by through faults, *i.e.*, faults occurring outside the zone, equal to fifteen times normal full load current, namely 7,500 A, with a possible peak value under transient conditions of two-and-a-half times the above current.

Oscillogram 1 is one of many taken during transient stability tests of apparatus designed to reproduce actual service conditions. The peak value of the differential or spill current at the moment of transient kick is insufficient to operate the restricted-zone secondary current earth-leakage relay when the latter is set on its 20 per cent. or 1–A tripping-current position, indicating that the current transformers fulfil the specified stability conditions.

For the third secondary, in the overload-protection circuit, the relays are set to operate with a 2-sec. time lag. The characteristics of the current transformer are such that,even up to twenty-five times normal full-load current, the secondary current varies reasonably well in relation to the primary current. To avoid saturation of the core under heavy overloads the flux density must be kept low at normal current. The core has, therefore, a large cross-sectional area and is built up mainly from " Stalloy " rings with the remainder " Mumetal." Since the latter material has better magnetisation-loss characteristics but is saturated at a lower

value of flux density than the " Stalloy," the current transformer, with a composite core, has, at normal load, higher accuracy than it would have if the core were entirely of " Stalloy " and yet maintains reasonably good accuracy up to the required overload limits.

Oscillograms 2 (*a*) and (*b*) were both taken on this secondary at rated burden but with different values of sinusoidal primary currents (I_p) ; NI_s represents secondary current to primary base and Ie the core-excitation current. Oscillogram 2 (*a*) was taken at ten times full-load primary current, the core flux density being a medium value (well below the knee of the B/H curve). Both NI_s and I_e were practically sinusoidal; thus this condition gave good secondary reproduction and accuracy. The phase angle error between primary and secondary currents is just visible in the oscillogram. Conditions at twenty-five times full-load primary current are shown in (*b*), the core being slightly saturated. The secondary current tends towards peaky wave form, whilst I_e is definitely peaky. This condition will give fairly good accuracy. The phase angle error displacement between primary and secondary currents has increased. These oscillograms were taken under steady-state fault current. It was assumed that, as the relay was set for a time delay of 2 sec., the decaying DC component of current had died away.



The tank and bushings were oil-filled as one integral part. The bushing has a dry-flashover value of 180 kV, a wet flashover value of 140 kV, and an impulse value of 320 kV for wave of one microsec. front and 50 microsec. to half wave tail. The secondary leads are by conduit entry, whilst the fittings provided include arcing horns, an oil gauge and a drain valve.

The " wound-primary " current transformer illustrated has a ratio of 150/5 A, an output of 20 VA, Class A.M. accuracy, and is insulated for connection in a 75-kV line. It is designed to withstand the mechanical and thermal stresses imposed upon it by a short-circuit, of 2 sec. duration, of a magnitude equivalent to 600 MVA. In this case the design difficulty is to obtain the desired accuracy without resorting to the use of a large number of primary turns with correspondingly high mechanical forces. Furthermore, too many primary turns may increase the inductance of the winding to such an extent that a voltage will build up across the end turns. This increase in inductance boosts the flux density in the core and, as a large number of turns requires more winding space, the mean magnetic path is also increased. Since the errors in a current transformer are proportional to the flux in the core and the length of the magnetic path, the accuracy will decrease. The core is built up from specially selected " Mumetal " strips and the plates are assembled so as to ensure good interleaved joints.

Thus the specified accuracy is obtainable with few turns in the primary coil. Even allowing for the asymmetrical peak of the short-circuit current, the stresses induced are only 1/15 of the ultimate strength of copper. The magnitude of the induced mechanical forces besides being proportional to the square of the number of primary turns is also proportional to the square of the initial peak value of the asymmetrical current. This may reach a magnitude of 2·5 times the RMS value of fault current which, in this instance, is 4,650 × 2·5, *i.e.*, 11,630 A peak. Oscillogram 3 was taken during a test of such transient conditions.

To allow for the thermal effects of the 2-sec. short-circuit, the copper section must, however, be approximately double that normally used.

The tank is oil filled and fitted with a conservator. The bushing is of the self-contained oil-filled pattern with a glass chamber at the top enabling the oil level to be ascertained. The bushing is of twin stem construction with coaxial leads. The central conductor is a fully insulated rod passing through a tube which acts as the return lead. The latter, having an annular cross section, can easily be made sufficiently strong to be able to withstand the forces which may be imposed upon it.

The flashover characteristics of the bushing are: Dry 255 kV, wet 215 kV, impulse 450 kV, for a wave of one microsec. front and 50 microsec. to half wave tail. The current transformer is fitted with a silica-gel breather and arcing horns.

South Shields Case

Origin of Dispute and Effect of Judgment

Last week we reported the decision of the House of Lords in the appeal by the Inland Revenue authorities from the judgment of the Court of Appeal in their action against the South Shields Corporation. The matters which led up to the case and the implications of the decision were ably dealt with by Mr. Hugh R. Ralph, treasurer to the Harrow U.D.C. and President of the Institute of Municipal Treasurers, in an article contributed to the "Financial Times" of August 12th. Through the courtesy of the Editor of that newspaper we are able to reprint the article below:—

THE decision of the House of Lords on the 5th August last confirming the findings of the Court of Appeal in the "South Shields" case—Allchin (Inspector of Taxes) *v.* Coulthard (borough treasurer, South Shields)—is one of considerable importance to local authorities throughout the country, and puts an end to a controversy which has been in existence for very many years.

The point which has now been settled in favour of the local authority is in its essence a simple one, and the difficulties which have arisen are entirely due to the fact that in this and other matters the Revenue authorities persisted in making an artificial distinction for tax purposes between a "real" person and an artificial person, such as a local authority—a distinction which, by the way, is not always made in the case of other bodies which owe their existence to statute.

Profits Assessment

The particular difficulty which has now been resolved arose in the first place in connection with the application of Rule 19 of the General Rules in the First Schedule of the Income Tax Act, 1918, which provides that where interest is payable wholly out of profits or gains brought into charge to income-tax, no assessment shall be made on the person entitled to the interest, but that the whole of the profits or gains shall be assessed and charged with tax on the person responsible for the interest. The person liable to make such payment (of interest) shall be entitled on making payment to deduct and retain a sum representing the amount of tax thereon at the rate or rates of tax in force during the period through which the said payment was accruing due.

This matter and its application to local authorities, and in particular to their trading activities—that is, electricity, gas, water and transport services—has had a long and chequered history and many thousands of pounds have been spent in actions in the Courts and in the time of local government officers and Inland Revenue officers in the effort to remove the disabilities from which a local authority suffered as compared with a private person.

Local authorities were for many years penalised because the Courts held prior to 1927 that an ordinary local authority must be regarded as at least two separate persons for the purpose of assessment to income-tax, the distinction being based on the fact that their powers were in general derived from two separate classes of statutes (a) those carried out under the Municipal Corporations Acts—the funds for which were provided from the borough funds levied as part of the poor rate and (b) those carried out as urban sanitary authority under the Public Health series of Acts and fed from the district fund provided from the general district rate.

Lack of Uniformity

This distinction was aggravated by the lack of uniformity of practice as to the rate liable for losses on trading undertakings, and it might easily happen that while on one fund the taxed profits exceeded the interest, the reverse conditions appeared in the other fund. The result was that the revenue added together the two largest items irrespective of whether they were interest or profits or one of each, and required payment on the total figure; moreover, different tax liabilities might arise in two local authorities in similar circumstances owing to local differences in attachment of trading undertakings to funds.

This injustice was partly overcome by the consolidation of rates under the Rating and Valuation Act, 1925, and the Local Government Act, 1933, which provided that all payments must be made out of the general rate fund and all receipts carried thereto, thus effecting a complete unification of funds for income-tax purposes; the local authority becoming one person.

Another difficulty had, however, been looming ahead. The Electricity (Supply) Act, 1926, restricted the amount of profit on the electricity undertaking which could be carried to the relief of rates, and imposed conditions which must be fulfilled before even a restricted relief might be given. The purpose of the restriction was undoubtedly to strengthen the position of the electricity undertaking's finances and to prevent an undue increase in the debt, but it has had another effect from a tax point of view which the draftsmen probably never intended. The difficulty was not, in the case of electricity, removed by the 1933 Act, which preserved any statutory restrictions on the application of profits.

As the amount of profit which could be applied in relief of rates had been restricted, the Revenue claimed that the general interest which could be paid out of profits or gains of the electricity undertakings brought into charge, must similarly be reduced and sought to assess the authorities on the balance of interest which, though covered by electricity profits, was in excess of the notional profits available for payment of that interest. It is to be noticed again that throughout this story runs the singling out of local authorities for adverse treatment. The individual running two separate businesses, financed perhaps by borrowed money, has no troubles of this kind. He, or his accountant, computes his profit as a whole and pays over the tax. He has, in the meantime, deducted and retained tax on interest paid by him and has provided the balance of tax out of the net profit. The same position, of course, arises in the case of a company incorporated under the Companies Acts which carries on two or more separate and distinct businesses.

Authorities Aggrieved

Local authorities not unnaturally felt distinctly aggrieved by the position thus created —namely, that an Act which had been passed for the expressed purpose of dealing with operational and administrative matters connected with the electricity supply industry, should become to all intents and purposes an instrument for increasing the corporation's income-tax liability—and eventually, in 1931, Brighton Corporation, who were in Parliament with a General Powers Bill, took advantage of the opportunity to seek, by local Act, powers to restore the position as it existed in 1926 prior to the passing of the Electricity (Supply) Act. Other local authorities followed suit, and, while some of the sections followed a different form, the principle—namely, the repeal of the special electricity provisions and their substitution—is inherent in all.

The particular sections are extremely technical in character, but were intended, as was fully admitted by the promoters, by taking the whole of the revenues of the trading undertakings to the credit of the general rate fund, and per contra charging all expenses incurred in earning such revenues, to free any surplus revenues for the payment of interest as a whole; at the same time the statutory restrictions as to the disposal of any surplus arising as a result of the operation of the electricity department were maintained, but the liability was transferred to the general rate fund, the revenues of which were available to meet such charges, while the interest is dealt with under Rule 19 as being paid out of profits or gains brought into charge.

The Board of Inland Revenue did not agree that the private Act powers could be so interpreted and the South Shields case has been taken as an agreed case. The South Shields clauses differed from those in the Brighton Act, but, as stated before, the principle is the same.

The authorities interested have supported South Shields Corporation throughout, and, on the technical side, the Income Tax Committee of the Institute of Municipal Treasurers and Accountants have maintained the very closest connection and co-operation with counsel, and all parties engaged. The result is in itself very gratifying, but not less so is the acknowledgment made to the work of the Institute.

Radio Standards in America

SINCE the United States entered the war the dollar volume of the radio manufacturing industry has increased fifteen-fold. Production in the early days was hampered by lack of standardisation of radio parts, giving rise to "bottlenecks," and when investigation revealed how serious this situation had become the Radio and Radar Section of the War Production Board asked the American Standards Association to undertake the standardisation of materials and parts to increase output.

Committees representative of the Army, Navy, primary contractors and sub-contractors met to draw up standard specifications and simplify the number of electrical characteristics and mechanical sizes used. This work has not yet been completed but is proceeding satisfactorily. When it is finished it is expected that all important components of radio will be interchangeable between the Army and Navy.

So far, four standards have been approved and additional parts standards are being circulated for comment and criticism from the industry composing about 500 manufacturers. The standards adopted are being used for lend-lease supplies and as a guide to the tooling up of various factories abroad. Eventually it is hoped that components will be interchangeable with those made in Great Britain and other countries of the United Nations.

Similar standardisation of parts has been undertaken for civilian radio at the request of the Office of Price Administration and the War Production Board. The American Standards Association states that some 62 standard volume controls have been proposed to serve as replacements for the majority of the thousands of different types used in home radio sets built in the past half dozen years, while nine electrolytic and eleven paper capacitors have been proposed to do a similar job in the capacitor field.

Each draft standard is circulated widely to industry and interested governmental agencies before final approval. After review of the comments, desirable revisions in the proposed standards are made by the American Standards Association committee before official approval.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Thermoplastic Cables

RECENTLY there have been many articles and statements in the technical Press regarding thermoplastic cables. It appears to my Committee that these publications are tending to overlook the war emergency background against which thermoplastics in general and polyvinyl chloride compounds in particular are being introduced into general cable manufacture, and it is felt that publicity should be given to the following considerations:—

(i) The major problem with which the cable industry is faced at this juncture is the maintenance of supplies of cables vital to the war effort in the absence of adequate supplies of various materials hitherto considered essential.

(ii) The overwhelming bulk of the industry's production is of cables for the Services. Of these quite a large proportion are short-life cables in the sense that under war conditions the circumstances in which they are used drastically limit their expectation of life.

(iii) The first of these factors assigns to thermoplastics the major role of saving rubber (including synthetic rubber); the second, coupled with the limited choice of polymers, plasticisers and extenders available under war conditions, determines the technical policy under which thermoplastic compounds are introduced for that purpose, and renders of secondary importance their development for meeting the wide variety of potential uses in general industrial and domestic wiring.

Thus, in the case of P.V.C., which is the principal thermoplastic material involved, these considerations have led to the necessity for standardising the compounds employed and limiting their number to the minimum dictated by Service needs. In so far as these compounds are suitable for cables for general wiring they are admitted under an amendment of B.S.7, but the preliminary nature of this step will be clear from the foregoing, and until further progress is made with development work in this field—and it is being given as much attention as war-time conditions permit—P.V.C. cables should not be used indiscriminately.

The present position may therefore be summarised by saying that as substitutes for war emergency rubber cables for general wiring work P.V.C. cables and flexibles will give satisfactory service under most conditions, and in that sense they must be utilised to the maximum possible extent in the national interest. Where, however, conditions are thought to be arduous or otherwise unfavourable, *e.g.*, where cables are to be installed under extreme conditions of temperature, the purchaser would be well advised to communicate with the Secretary, Cablemakers' (War Emergency) Technical Committee (a committee which represents from the technical standpoint the British cable-making industry as a whole), Hamilton House, Victoria Embankment, London, E.C.4, from whom he can obtain unbiased advice as to the suitability of P.V.C. cables for the particular type of service involved.

Dorking. W. A. BISHOP, *Chairman*,
Cablemakers' Planning Committee.

Training for Higher Posts

THE industrial organisation of the electricity supply industry is good and has functioned successfully for a long period, but there is one other sphere which is weak, quite inadequate and unorganised and yet of high importance. I refer to the proper training of sufficient engineers to fill eventually the higher positions. On no question have I found more agreement with the fact, but on no question more apathy towards proposals to put matters right.

What is required is a scheme under which each large undertaking having generation, distribution and administration in every form would at all times have on its staff a few men selected to undergo special training in all departments including administration, who would be carefully watched and helped by the senior members of the staff and have reguarly the personal attention of the chief himself.

The old argument that it would mean the expense and trouble of training men only to see them go elsewhere would have to be dropped. The outlook would need to be altered to view this expense and trouble as contributions to the good of the whole industry, to create a pool of fully trained men from which all could draw whenever necessary, and to see that for a man to go to another undertaking was a good thing because if later the first undertaking had a position for him he would come back with the added experience gained in the meantime.

Such training would of necessity have to be given by the large undertakings, company and municipal, as they alone have got the full number of departments, every type of lay-out and equipment, together with the staffs to enable complete training to be given. This is essential. The men who undergo such a

course would be able to take up the highest positions in the industry with credit professionally, administratively and representatively.

The candidates for this special training would have to possess a sound educational foundation and should be recruited from among those who have taken a first-class engineering degree and be obtained through the Appointments Board of any of our universities. It would be likely that each undertaking would prefer and would be able to obtain the recruits from the particular university in or near its own area.

I am not criticising the present staff, but it is a fact that while a man may be a good charge engineer or an excellent distribution engineer he may not possess the personality or the education which would enable him to write a good report, to judge correctly the technical and commercial value of new proposals, to manage a large staff, to represent his undertaking and hold his own on the many organisations or to take a full part in the meetings of municipal committees or boards of directors. The men who came successfully through the training I have outlined would be able to do these things.

Manchester. W. WALKER.

The Operator "j"

IN his letter published in your issue of July 30th, Mr. C. Turnbull makes a plea for his "newer method" of vector representation, on the score of simplicity where the multiplication of vector quantities is concerned. However, his method, although original, is not new in the sense implied by him, for the "polar" method of vector representation has been in use by both power transmission and communication engineers for a long time. I agree with him that it is unfortunate that the textbooks on AC still adhere to the "rectangular" notation which was introduced by Steinmetz some fifty years ago.

The "polar" notation derives from Euler's theorem, $\cos\theta + j\sin\theta = \epsilon^{j\theta}$, which is almost unknown to electrical students. This is a great pity, for the proof is absurdly simple compared with that of De Moivre's theorem, which, incidentally, follows automatically from Euler's theorem. For we have $\cos n\theta + j\sin n\theta = \epsilon^{jn\theta} = (\epsilon^{j\theta})^n = (\cos\theta + j\sin\theta)^n$.

In practice, the vector operator $\epsilon^{j\theta}$, which signifies a rotation through the angle θ, is denoted by $\angle\theta$. It is identical with Mr. Turnbull's "revor" 1^m, where $m = \theta/2\pi$, for his unit of rotation is one revolution ($=2\pi$ radians) instead of one radian. There is no advantage whatsoever in abandoning electrical radians in favour of Mr. Turnbull's "millirevs" or "jots." The standard "polar" notation will do all that his more cumbrous "revor" notation will do.

For example, consider the multiplication of two vectors $\mathbf{A} = A_1 + jA_2 = A(\cos\alpha + j\sin\alpha) = A\angle\alpha$ and $\mathbf{B} = B_1 + jB_2 = B(\cos\beta + j\sin\beta) = B\angle\beta$. The vector product is simply $\mathbf{AB} = AB\angle(\alpha+\beta) = X + jY$, where $X = AB\cos(\alpha+\beta)$ and $Y = AB\sin(\alpha+\beta)$.

Similar reasoning holds for the division of vector quantities. In practice, of course, the angles of rotation α and β will be expressed in degrees rather than radians.

What of rotation through a right angle? We find in this case $\angle 90° = \epsilon^{j90°} = \cos 90° + j\sin 90° = j$.

For rotation through two right angles we have $\angle 180° = \angle 90° \times \angle 90° = j^2$. But $\angle 180° = \epsilon^{j180°} = \cos 180° + j\sin 180° = -1$. Hence the operator "$j$" denotes rotation through a right angle while being defined by $\sqrt{-1}$.

Finally, the polar method of vector notation avoids all ambiguity in dealing with roots. The two square roots of 1 are, with $1 = \angle 360°$ or $1 = \angle 0°$, simply $\angle 180° = -1$ and $\angle 0° = +1$. The four fourth roots of 1 are similarly seen to be $\angle 0° = +1$, $\angle 90° = +j$, $\angle 180° = -1$ and $\angle 270° = \angle -90° = -j$. In the same way the three cube roots of 1 are $\angle 0° = +1$, $\angle 120° = -0{\cdot}5 + j\,0{\cdot}866$ and $\angle 240° = \angle -120° = -0{\cdot}5 - j\,0{\cdot}866$. These last three are, of course, the vector operators 1, α and α^2 used in symmetrical component analysis.

Hurlingham, S.W.6. H. RISSIK.

An International Institution of Engineers

IN view of the great need for the utmost co-operation and enthusiasm during post-war reconstruction, it has occurred to me that the time is now opportune for the inauguration of an International Institution of Engineers, or at least an Empire Institution of Engineers or an Empire Engineering Society. The post-war possibilities of air transport are such that conferences and meetings would be facilitated, and rapid progress should be made in all directions. Bearing this in mind, I feel that engineering in its many branches should go ahead if engineers of all nationalities will only get together and pool their problems and achievements.

I appreciate that pre-war world conferences did good service within certain limits, but if progress is to be made in the right direction, and in our time, then free and frank discussions of all problems concerning the well-being of the peoples of the world are necessary. This has been an engineers' war, let it be an engineers' peace.

Perhaps other engineers have views on this matter and may be able to collaborate in paving the way for such an institution, especially as there are many engineers of our allies in this country at the present time.

Bradford. T. H. CARR,
A.M.Inst.C.E., M.I.Mech.E., M.I.E.E.

PERSONAL and SOCIAL

News of Men and Women of the Industry

WE are informed that **Mr. Harold Bright**, M.A., A.M.I.E.E., has been released from his post as Electrical Inspector of Factories in order to return to the consulting practice of Richards & Bright. **Mr. Lancaster Burne**, A.M.I.C.E., M.I.Mech.E., late of 11, Great Ormond St., W.C.1, is now associated with the firm and has transferred his office to the same address. Friends of **Mr. A. F. W. Richards**, M.I.E.E., will be glad to know that he has recovered from his serious illness and is returning to business shortly.

Mr. George W. Parker has been appointed borough electrical engineer of Grimsby on the retirement of Mr. S. R. Windle, to whom he has acted as chief assistant since 1932. Mr. Parker was educated at the Grammar School, Caistor, Lincolnshire, and there received part of his technical education, which was later continued at the Technical School, Newark-on-Trent, and the Grimsby Municipal College. After serving a two years' apprenticeship with W. P. L. Harrison & Co., Newark-on-Trent, he was for a period at the Grantham, Lincs., electricity works.

Mr. G. W. Parker

He then joined the staff of the Corporation electricity works, Grimsby, in October, 1903, as a junior assistant. Three years later he was appointed mains superintendent, and continued in this position up to his promotion as chief assistant. During the last war he served in France, was severely wounded, and was awarded the Military Medal and bar.

Mr. A. Hammerton, late of General Radiological, Ltd., has now joined the staff of Electro Methods, Ltd., as assistant to the managing director.

Friends of **Mr. H. J. Grant**, a director of Alliance & Surrey Wholesale, Ltd., will be sorry to learn that his residence, "The Cordons," Redbourn, Herts, was destroyed by fire on July 30th.

Mr. W. F. Hardstone has recently completed fifty years' service with G. A. Harvey & Co. (London), Ltd. Starting as a boy in 1893, he later became manager of the Estimating Department and followed this by taking control of the Metal Perforating Department, a position he still holds. His comprehensive experience in all branches of the business earned him promotion to the board of directors in 1935.

Major J. M. Campbell has asked to be relieved from his duties as Joint Deputy Controller for Raw Materials in the Iron and Steel Control, and **Mr. C. R. Wheeler**, who has held office jointly with Major Campbell, will carry on as Deputy Controller. The Iron and Steel Controller has accepted with regret the resignation of **Mr. T. H. Summerson** as Director for Steel Castings, whose release has been applied for by his company. His place will be taken by **Mr. H. Humphries**, who will also continue his existing office as Director for Steel Forgings, and Tyres, Wheels and Axles. **Mr. P. C. Fassotte** will continue as Technical Director (Castings) and **Mr. H. P. R. Scott** as Deputy Director for Steel Castings.

Mr. R. A. Riddles, C.B.E., mechanical and electrical engineer, Scotland, with the London, Midland and Scottish Railway, who since the beginning of the war has been Deputy Director-General for Royal Engineer Equipment, Ministry of Supply, is to be chief stores superintendent of the L.M.S. in place of **Mr. S. J. Symes**, who is retiring at the end of October. He will be succeeded at the Ministry by **Mr. R. A. Davis**, M.B.E., whom he will continue to advise for the time being on questions of locomotive design.

Lanark County Council at a recent meeting appointed **Mr. David Lawson**, the present lighting assistant in the County Engineer's Department, as county lighting engineer. There is now only one special lighting district in the county.

Mr. C. E. Blee, who has been appointed chief engineer of the Tennessee Valley Authority was at one time with the British Columbia Electric Railway Co. and supervised the construction of the Alouette, Ruskin and Bridge River developments.

Mr. H. M. Sharp, manager, Lighting Bureau, Niagara & Eastern Power Corporation, Buffalo, has been elected president of the American Illuminating Engineering Society and will take office on October 1st.

Obituary

Mr. C. B. Gee.—We regret to report the death on August 15th at the Royal Masonic Hospital, Ravenscourt Park, W., of Mr. Colin B. Gee. Mr. Gee, who was forty-seven years of age, was educated at Manchester University and held the degree of B.Sc.Tech. After serving an apprenticeship with the British Thomson-Houston Co. he joined the British Westinghouse Co. in 1920 and later was with the English Electric Co. He joined Crompton Parkinson, Ltd., in 1931 and since that date had been a designer in the company's Traction Department. He was a member of the Institution of Electrical Engineers.

Mr. T. B. Brayshaw.—The death has occurred at Bolsover, Chesterfield, of Mr. T. B. Brayshaw, who was the senior partner of the firm of Brayshaw's, electrical contractors, of Chesterfield.

Mr. J. Reid.—The death is announced of Mr. James Reid, of Fort William, who was in his fiftieth year. His father was the engineer of the former Fort William Electric Lighting Co., Ltd. After the last war, in which he served in the East, he set up in business and later took over the electrical and radio business of Mr. William MacDonald, High Street, Fort William.

COMMERCE and INDUSTRY

War Insurance Premium. Dismissed Employee's Reinstatement.

Commodity Insurance Scheme

THE Board of Trade announces that the rate of premium payable under any policy issued under the Commodity Insurance Scheme shall continue to be at the rate of 2s. 6d. per cent. per month in respect of the period from September 3rd to December 2nd next. The monthly and three-monthly policies for a fixed sum and the three-monthly adjustable policies previously issued will be continued.

Static Rectifiers

Non-rotary rectifiers have been made for outputs ranging from a fraction of a milliampere at extra-high voltage to several thousand amperes at a few volts. Very many forms and sizes are known, but the commoner commercial requirements can usually be satisfied by relatively few types, which are described in detail in a 60-page technical booklet by Mr. F. G. Spreadbury, published by the Association of Engineering and Shipbuilding Draughtsmen, Mansefield, Market Street, Rugeley, Staffs.

It commences with a short explanation of asymmetrical conductivity, followed by concise descriptions of rectifiers of the metal (selenium and copper-oxide) and glass-bulb (thermionic, vacuum, gas-filled and mercury pool) types, characteristics being outlined with the aid of formulæ. The five factors which influence choice of type for a given duty are dealt with in a section on design and typical circuit diagrams are included ; current and voltage relationships lead to comments on transformer ratings and an indication of the manner in which phase equalisation is carried out. Finally, there are brief references to the use of single-phase rectifiers for charging batteries and driving DC motors.

Motion-picture Projectors

The acoustic performance of 16-mm (sound-motion) picture projectors is treated of in a 55-page technical circular (C. 439) issued by the U.S. National Bureau of Standards. The information presented is intended to assist prospective purchasers to prepare specifications and select equipment capable of good performance, yet not excessive in cost, for educational purposes and intensive short-term emergency training. Objective test methods are described in detail and simplified means of measuring sound are indicated. Although the over-all performance of the equipment is stressed, its assessment is not easy because some of the characteristics cannot be directly measured. Improvements, in seven respects, are suggested which it is believed would enable makers to market a far superior product and induce educational authorities to show a keener appreciation of projection equipment.

Armour Plate Welding

It may now be revealed that the article published under the above heading in the *Electrical Review* of June 18th, p. 805, was prepared in collaboration with Guy Motors, Ltd., to whom we are indebted for facilities for collecting the information and taking the photographs.

The first four-wheel-drive, rear-engined, all-welded armoured fighting vehicles produced in this country were the Guy Mark I. This vehicle, developed by Guy Motors, had a complement of three and was equipped with two machine guns in a rotating welded turret. Many of these "Guy light tanks (wheeled)", as they were then called, were used by the British Army during the early fighting in France.

The Guy Mark I armoured car

Reinstatement of an Employee

At Hove on August 12th a fine of £25 (with five guineas costs) was imposed on C.V.A. Jigs & Tools, Ltd., for failing to reinstate a timekeeper when directed to do so by a National Service Officer. It was stated on the company's behalf that the employee had been dismissed for serious misconduct; he had struck and injured a superintendent who had complained of his work and had been bound over for assault.

The general manager of the company said that the reinstatement of the man would lead to his position and that of the superintendent's becoming untenable. They had not previously applied for permission to dismiss the man

because of their past experience of the methods of National Service Officers.

The chairman of the Bench said that the company was bound to comply with the officer's order. The defendants' representative said that his clients would appeal against the decision as a fundamental principle affecting essential work was involved.

The Coal Grievance

A correspondent to the *Gas Times* complains about the treatment accorded the gas industry in the matter of coal. He says that the industry has bowed to the inevitable quite long enough both in regard to the cost of coal and its quality. Frequently the industry has paid inflated prices for inferior coal. The mining industry is under no statutory obligation but the gas industry is. "The Ministry of Fuel and Power has taken under its wing the gas and electricity and coal mining industries. Are these industries equal partners or has any one of them preferential treatment? Should not the gas industry endeavour to assert itself as something a little more than Cinderella by working hard for a panel under the ægis of the Ministry of Fuel and Power to collaborate and co-ordinate the appropriate fuels to the respective consumers? Would it be beyond the power of such a panel to regulate and control prices of the various types of fuel to be used, either for carbonising or generating electricity?"

He further states that there are cases to-day where steam coal is delivered to gas undertakings and gas coal delivered to the electricity works—both undertakings being in the same area—and rightly says: "This is not a happy state of affairs."

Labour Control Order

To prevent waste of labour power and to ensure that men and women engaged in work of national importance do not leave it for positions where they are not so usefully employed, the Minister of Labour and National Service has made an Order requiring employers to notify the local employment exchange when men between the ages of 18 and 64 or women aged 18 to 59 (inclusive) leave their employment. This requirement is already made in the case of people coming within the scope of an Essential Work Order. The new Order does not apply to part-time workers doing less than twenty hours a week and to a number of other specified classes.

Emergency Legislation

It is practically impossible for anybody engaged in industry or commerce to read and digest the almost enumerable Acts, Orders and regulations which continue to come from Parliament and the Government Departments and sub-departments. Thus anybody who accurately summarises, collates and explains these measures can be regarded as a benefactor. So far as the electricity supply industry is concerned, this has already been done by Messrs. J. W. Simpson and Leslie Gordon. In the general way a similar useful service is rendered by Butterworth & Co. (Publishers), Ltd., 37, Essex Street, Strand, W.C.2. At the beginning of the war Messrs. Butterworth commenced their Emergency Legislation Service and since then have regularly continued to send subscribers new Acts and Statutory Rules and Orders with annotations and explanations, as well as digests of legal actions and other information bearing on emergency legislation. The accumulated information up to August 31st, 1943, costs £15 (plus postage) and the quarterly subscription for the fortnightly issues of the service is approximately 36s., with a separate charge for Statute supplements.

Gas Industry Co-ordination

According to the *Financial Times*, 250 gas undertakings, representing a total capital of £250 million, have joined together to bring about the close co-operation in the industry to which reference has been made in recent speeches by chairmen of gas companies.

A new body, the Association of Gas Corporations (which will succeed the Association of Gas Holding Companies), will bring together the common interests of works supplying 1,400,000 consumers with 41,000 million cu. ft. of gas per annum. Sir David Milne Watson is the president of the Association, membership of which consists of eleven holding concerns. It is stated that the objects of the Association are "generally to promote the welfare of the industry, but, in particular, to assist gas corporations so that their controlled companies shall provide the best service to the community."

Shoe Factory Lighting

Most trades require individual treatment in the matter of efficient lighting, and the installation of B.T.H. lighting at the factory of J. Palfreyman & Co., Ltd., boot and show manufacturers, was specially designed for the particular needs of the work performed. It comprised forty-five 80-W "Mazda" fluorescent lamps in "F.107 Mazdalux" reflector units. The fittings have been installed as symmetrically as possible to give the maximum amount of illumination over each machine. The intensity on the working plane is approximately 15 foot-candles and shadows are practically eliminated. The electrical installation work was carried out by C. N. Rogers, Leicester.

Public Transport Association

The first annual meeting of the newly formed Public Transport Association, Inc., will be held on Thursday, September 9th, at 2.30 p.m. at the Waldorf Hotel, Aldwych, London, W.C.2. The meeting will be purely formal and the only business which is due to be transacted is the election of auditors for the period from the incorporation of the Association up to December 31st, 1943.

The Building Industry

In a booklet entitled "The Building of a New Britain," by B. S. Townroe, D.L., Hon. A.R.I.B.A., it is complained that the Ministry of Works has not taken advantage of the knowledge and experience of the building industry as represented by the Building Industries National Council, which claims to represent over 80 per cent. of the responsible sections of the industry.

The building industry is said to be the second largest directly employing industry in the country; with directly dependent subsidiary industries it governs the employment of at least

two million male workers, among them being those in the electrical wiring and contracting industry to the number of 42,820 (July, 1939) who are said to be almost entirely dependent upon building and public works activity. In addition to these there are 861,580 workpeople in industries indirectly affected to a substantial degree by activity in building and public works, including 122,890 in electrical engineering and 185,290 in the manufacture of electric cables, apparatus, lamps, etc.

Fraudulent Consumption

At Halifax West Riding Court recently three persons were each fined £5 and 7s. costs for having fraudulently abstracted electricity after the supply had been disconnected by the Electrical Distribution of Yorkshire, Ltd.

The first defendant pleaded guilty, saying that he had reconnected the supply in February, 1940, because there had been illness in the house. He stated that there was no intention to defraud and that he would pay the account if allowed to do so. For the company, evidence was given that the supply was disconnected on March 31st, 1939, owing to arrears in accounts. The number of kWh recorded since the first disconnection was 481, of the value of £11 2s. 9d.

In the second case dealt with the supply had been disconnected on August 23rd, 1939, and 314 kWh had since been consumed, valued at over £8, which, on the basis of previous consumption, it was stated, suggested that the use of electricity had been enjoyed for some 40 months. The third defendant was a neighbour of the second and in this case 319 kWh had been consumed.

Hot Water Installations

A war emergency code CP2: 1943 for Heating and Hot Water Service Installations has been issued by the British Standards Institution for the Codes of Practice Committee set up under the ægis of the Ministry of Works.

This Code makes recommendations as to the most suitable forms of heating installations to be adopted at the present time and sets out the guiding principles to be considered in deciding on the type and size of system to be installed. Its aim is to secure maximum economy not only in labour and materials but also in fuel and power. Copies of the Code are obtainable from the B.S.I., 28, Victoria Street, London, S.W.1, at 1s. each.

Fatalities

An inquest held recently at Cranfield, Bedfordshire, provided yet another example of the fatal consequences which may attend the use of portable electrical apparatus in bathrooms. The victim in this case was Mrs. Ivy Edna Hildreth, who was killed by electric shock while in her bath. Mr. A. W. Evans, of the Bedford Corporation Electricity Department, gave evidence that the switch in the bathroom was incorrectly connected and a bowl fire was plugged in by an adaptor with a holder over the wash basin. The result was that a voltage of 230 was maintained on the elements of the fire notwithstanding that the switch was off. A verdict of "Death by misadventure" was recorded.

At an inquest on Mrs. Annie G. Baggaley (37), at Bircotes, Harworth, last week, it was stated that she received a shock when an electric boiling ring fell into a zinc bath during wash-day operations. Mr. T. Evans, electrician at Harworth colliery, said that no permission had been given by the management to connect domestic appliances to the lighting flexes. A power plug should have been installed. A verdict of "Accidental death" was recorded by the coroner.

Newspaper Electricians' Wages

A claim for an increase in their war bonus was recently made by members of the Electrical Trades Union employed by members of the Newspaper Proprietors' Association. The claim was heard on July 30th by the National Arbitration Tribunal, when evidence was put forward regarding the wages paid to electricians and electricians' assistants and other relevant matters. In its Award No. 414 the Tribunal says that after giving careful consideration to the statements and submissions made on behalf of the parties it finds against the claim and awards accordingly.

Contract Price Adjustment Formulæ

The latest figures for use in the B.E.A.M.A. contract price adjustment formulæ are as follows:—(*a*) "Rates of Pay."—The rate of pay for adult male labour at August 14th shall be deemed to be 86s. 6d. (no change); (*b*) "Costs of Material."—The index figure for intermediate products last published by the Board of Trade on August 14th is 171·4 and is the figure for the month of July, 1943 (no change).

Dissolution of Partnership

The *London Gazette* of August 10th announces that the partnership between Mr. Edward Hopkinson Smith and Mr. Norman Pogson, carrying on business as electric motor manufacturers at Park Royal Road, North Acton, London, W.3, under the style of Hopkinson Induction Motors, was dissolved on October 28th, 1941.

"Electrical Review" Index

Copies are now available of the index to Vol. CXXXII of the *Electrical Review*, and readers desiring them should apply to the Publishers, *Electrical Review*, Dorset House, Stamford Street, London, S.E.1.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

CO. EL. EC. HEREFORD radiator bar.

PERFECTA hair drying apparatus.

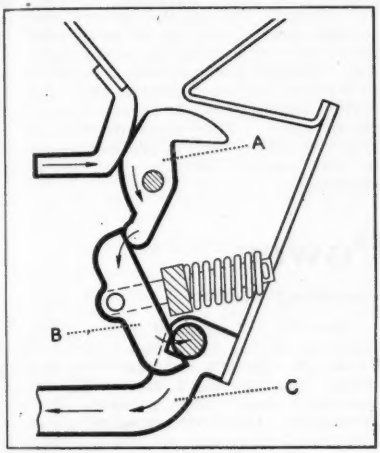
Low-voltage Circuit-breaker

Construction of a New Air-break Model

BECAUSE low-voltage oil circuit-breakers in the smaller industrial installations are apt to be somewhat neglected as regards maintenance, the possibility of substituting air-break gear is attractive.

The latest three-phase "A.I.R." circuit-breaker developed by the Metropolitan-Vickers Electrical Co., Ltd., for up to 660 V with ranges of 600, 1,200, 2,000 and 4,000 A is built in floor-mounting sheet-steel cubicles with draw-out isolating features. For the 600-A range two circuits may be arranged in tier formation to conserve space.

The main contacts for the three phases are carried on a common bar of steel insulated

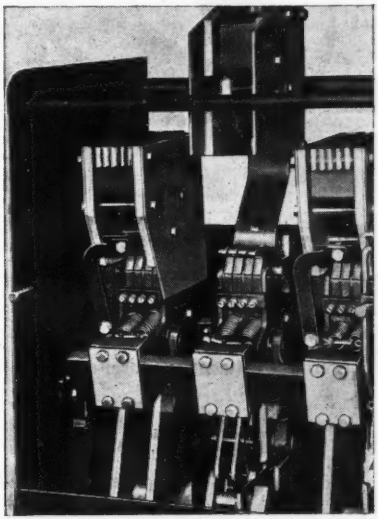


Diagrammatic representation (arrows) of current flow in hinged contact

with bakelite. The accompanying diagram illustrates the arrangement of a standard 600-A contact. All shunts between the moving contacts "A" and the fixed portion "C" have been completely eliminated by means of the spring-loaded bridge "B", while the magnetic loop formed by the conductors increases the contact pressure, guards against lift and chatter, and prevents welding. The contacts are of the rolling-butt high-pressure type, four in parallel per phase. Dressing and bedding are unnecessary after operation under heavy load or fault conditions, as sufficient pressure and wipe are present to ensure good contact after each operation. The arc forms above the areas which make contact when the breaker is closed.

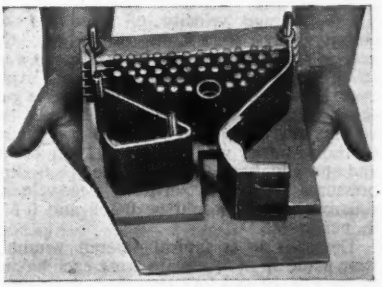
Arc-chute dimensions have been reduced by introducing a large number of stout metal rods which are arranged across the path of the arc to control it and cause quick cooling.

For the larger normal ratings supplemen-



Three-pole "A.I.R." 600-A circuit-breaker with centre arc chute raised for contact inspection

tary main contacts, comprising a heavy copper bar bridging numerous silver contact strips, are mounted on the back of the circuit-breaker panel and are operated by means of rods connected to the arcing contacts. These main contacts are arranged so as to make



Arc chute partly dismantled

after, and break before, the arcing contacts have operated.

Provision has been made for a reasonable combination of protective coils, including overcurrent, earth-fault, under-voltage and shunt trip coils. Up to and including the 600-A size, the over-current coils are usually series wound, either with or without mechanical time-lags. For ratings over 600 A they are operated from the 5-A secondaries of current transformers. When series over-current coils are used, the breaking capacity of the circuit-breaker may be limited by the thermal rating of the coil.

Contacts in good condition after 60,000-A tests. (One make and two make-break shots)

In order to meet conditions where normal currents are small and the breaking capacity requirements high, it is recommended that transformer-operated coils be adopted. The earth-fault release is energised from the secondary of a ring-type current transformer which encircles the outgoing cables; this arrangement permits of an earth-fault setting of 5 per cent. When employed, current transformers for operating relays, instruments, metering, etc., are designed specially, both thermally and mechanically, for the system on which they are to operate, and are generally of the bar-primary type.

There is no British Standard Specification for such air-break circuit-breakers as these. They have therefore been subjected to the same series of tests as is applied to oil circuit-breakers for power station service (B.S. 116/1937, Part I). The complete series of tests was carried out with one set of arcing contacts, which were not trimmed up or touched in any way. The speed of operation is claimed to be so high and arc attenuation so rapid that the current cannot attain to its maximum short-circuit value. Tests therefore have to be evaluated on the basis of prospective current, in the manner familiar in fuse-testing technique.

Wind Power

Scope for Small Generating Plants

ALTHOUGH the contribution made by the wind to the total power used in this country bears no relationship to the length of its use in history, those units that are now in service have proved sufficiently successful to encourage the view that its employment should be extended. A large field for development may be anticipated in meeting the electrical requirements of isolated farmsteads and numerous other country establishments.

The average velocity of wind in this country day and night throughout the year is 7½ m.p.h., while 15 m.p.h. may be relied upon for eight hours out of every twenty-four. As the power obtainable per sq. ft. of sail area is equal to the cube of the velocity divided by 350,000, at the lower figure the horse-power would be 0·0012 per sq. ft. and at the higher 0·0096. The corresponding pressures, found by dividing the velocity squared by 333, would be 0·169 and 0·675 lb. per sq. ft.

The sails of a typical veteran windmill were made up of four main arms, each having 20 by 8 ft. of sailcloth stretched on a lattice framework, giving a total area of 640 sq. ft., so that the HP available with a 7½-m.p.h. wind was 0·768, which rose to 6·14 HP at 15 m.p.h. Despite the restricted demand, design has progressed and to-day electric generators and pumping plants are well-established. For modern windmills, standard rotors have diameters of 8, 10, 12 and 14 ft. In first cost, before the war, they compared favourably with oil engines.

What is needed in most cases is a plant of 10 to 20 kW capacity with inherent constant-voltage regulation for running in parallel with a battery of sufficient capacity to provide lighting, cooking and essential power to the average small farm. Proper maintenance of batteries would entail some arrangement whereby skilled attention could be given them by experts.

Small wind-driven 12-V generators have been found a great boon to the countryside in the charging of accumulators for radio receiving sets and motor cars. These sets are fitted with twin-bladed propellers of the aeronautical type. In some instances 50 V has been adopted so that houses in the immediate neighbourhood can be lighted.—J. L. G.

Farm Grinding Equipment

Recent Tests at Norwich

TRIALS have been recently carried out by the Norwich Corporation Electricity Department with small grinding equipment evolved from experimental models tested by the Electrical Research Association in conjunction with Rothamstead and Oxford Agricultural Engineering Institute, Reading University and the West of Scotland Agricultural College.

For these trials, a demonstration equipment was built on a small two-wheeled truck, as shown in the illustration. A hopper to hold about three bushels of grain was fitted over the small mill hopper, and a storage bin was mounted at the end of the truck to receive the meal. This was delivered from the mill by a fan through piping supplied with the equipment. In a normal farm installation the bins would, of course, be of a much greater capacity to take advantage of the automatic operation of the equipment Many farmers who use these mills, fill the grain hopper in the evening, switch on the motor and leave the equipment to do its job without attention. When the grain has run through the mill, an automatic flap switch cuts out the motor.

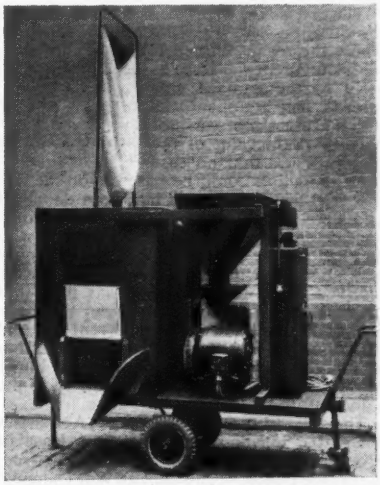
Power Consumption and Cost

The first test was made with three coombs of barley and ten of oats, using fine and medium screens ($\frac{5}{32}$ in. and $\frac{11}{64}$ in.). The consumption during this trial run was 48 kWh which, at 2d. per kWh, cost 8s. At this rate, the cost of power for mixed grinding averaged 7s. 8d. per ton. The second test showed similar results, but this time seven bushels of linseed were put through without a carrier. Upon dismantling the mill, it was found that the interior had been left perfectly clean.

Test number three was chiefly with oats, mixed with a small quantity of barley, and the grinding was carried out as follows:—36 bushels using $\frac{11}{64}$-in. screen; 4 bushels using $\frac{1}{4}$-in. screen; 4 bushels using $\frac{5}{32}$-in. screen; and 1 bushel using $\frac{1}{16}$-in. screen. This used 21 kWh and, because of the coarser screens employed, the average cost was only 3s. 4d. per ton.

The fourth test consisted of timing the rate of grinding, and it was found that with a mixture of barley and oats, the rate varied from four to fifteen bushels per hour, according to the screens employed. To many farmers who are used to hammer mills, this will seem a very low output figure, but the rate of grinding is not important, since no labour is used for direct bagging. Five to ten tons per week is easily within the capacity of the equipment.

The mill, motor and fan are built on a common bedplate, forming a very efficient unit, capable of grinding at the lowest possible cost. A 3-HP, three-phase or single-phase motor can be fitted, which makes



Automatic equipment for grinding grain

the equipment suitable for use on practically any farm or small-holding, and a complete installation can be fitted up on most farms for between £70 and £80.

The flow of grain into the mill is regulated by a simple slide controlling the air suction of the fan, and once set, does not vary. The meal can be conveyed by piping to an adjacent storage bin or to a loft. Alternatively, a cyclone attachment can be added, for binning or sacking direct as required.

The whole unit, with the exception of the bins, occupies a floor space of only 3 ft. by 1 ft. 6 in. The advantage to the farmer in eliminating labour and to the supply undertaking in reducing the demand from 20 or 30 kVA to 3 kVA will be apparent.

In these days of labour and transport difficulties, many Norfolk farmers have been glad to adopt, at the suggestion of Mr. J. A. Sumner, city electrical engineer, Norwich, this form of automatic grinding equipment.

War-Damaged Premises

Remission or Reduction of Rent

By F. E. Sugden,
A.C.I.S., Barrister-at-Law

IN previous articles I have dealt with the Landlord and Tenant (War Damage) Act, 1939, and the amending Act of 1941 in reference to the rent of war-damaged premises. Recently much difficulty has been experienced both by landlords and tenants regarding the rent payable for premises damaged by enemy action and two important cases have been before the Courts.

The first is *in re* Orbit Trust, Ltd., Lease, and the question here was substantially whether, where the tenant elected to retain the lease, the ground rent was to be reduced proportionately to the damage sustained. The argument was that a ground rent was not fixed upon the value of the buildings and that no case for a reduction could be based upon the fact that part of the buildings had been damaged and were unfit for occupation. The Court considered it inequitable that a tenant who had lost the use of part of the property should be obliged to continue to pay the full rent reserved. For this reason it was held that the loss should be shared between the landlord and tenant and the ground rent reduced in proportion to the damage sustained, that is, in accordance with the proportion borne by the value of the damaged property to the value before the damage was done.

The real difficulty under the Act arises where the tenant disclaims a long lease of property which has been practically destroyed. Under the Landlord and Tenant(War Damage) Act the tenant is freed from his liabilities and under the War Damage Acts he appears entitled to receive practically the whole of the insurance money without any liability to reinstate. Further, where property is valued as a whole, slight damage should not be taken into consideration, but where damage is capable of separate assessment, such as one flat being rendered unfit, there is no reason why such damage should not be taken into account. It is irrelevant that the lease contained full repairing covenants. While the position of the lease is unaffected, the tenant is in no circumstances forced to make good any damage caused by enemy action.

Date from which Reduction Operates

The second case is that of the Prudential Assurance Co., Ltd., *v.* Reville. The main point here was purely one of the construction of the relevant provisions of the Landlord and Tenant (War Damage) Act and upon this the Court of Appeal decided that the reduction of rent could operate only from the date of the service of the Notice of Retention and not from the date on which the war damage occurred. Incidentally, the Court decided a subsidiary matter which is of some importance. A plaintiff may abandon a part of his claim and in the County Court he may be forced to do so because some part of his claim is beyond the jurisdiction of the Court. This principle or practice cannot, however, be extended to an application such as the present so as to restrict it to the provisions of one particular section of the Acts to the exclusion of other sections which are relevant to the issue. The duty of the Court upon such an application is to do justice between the parties having regard to all the relevant provisions of the Acts and the applicant cannot base his application solely on the provisions of one particular section or subsection and thus prevent the Court taking into consideration the other relevant provisions.

The decision in this case that the tenants were only entitled to a reduction of rent from the date of the service of a Notice of Retention of the lease, applies only in the cases of long leases (99 years). Short tenancies are governed by the 1941 Act.

It should be remembered that although it is open to a tenant in the County Court to abandon part of his claim in an action, in an application where the duty of the Court is to make an order fair to both parties he may not base his application on one section of the Act to the exclusion of any other which may be appropriate.

Need for Correct Procedure

When a tenant is placed in the position of having to ask for a reduction of rent he should certainly make sure that he adopts the right procedure in accordance with the Landlord and Tenant (War Damage) (Amendment) Act, 1941; that is, before he does anything regarding his liability he should certainly apply to the County Court for the Judge to determine to what extent the premises have been damaged and ascertain what rent should be paid for the undamaged portion, or if they have been reinstated, that they should be let at the original rent unless they are so constructed that they could not be restored to their former state.

My advice is that, first of all, the tenant should call in a surveyor to inspect the premises minutely so that he can be in a position to explain in detail by means of a summary and by subsequent oral examination the present state of the premises.

ELECTRICITY SUPPLY

Hazel Grove Controversy. Results at Southport.

Blackpool.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow for switchgear modifications at the power station.

Hazel Grove and Bramhall.—INVESTIGATION TO PROCEED.—The rescission of a resolution calling for an investigation into the affairs of the Electricity Department was moved at the last meeting of the Urban District Council by the vice-chairman of the Electricty Committee, Councillor R. Dean, who said that the setting up of a committee of investigation would convey the unjust impression that the undertaking was badly managed. During the past few years it had been entirely overhauled and at present it was dealing with the requirements of the district on a proper businesslike basis. The criticism, which came from outside, was entirely uninformed. He explained the position with regard to bulk supply costs and said that these had shown certain increases which they did not expect. He contended that the 20 per cent. increase in tariffs was eminently reasonable, and pointed out that an annual investigation was made by a Government auditor.

The motion was supported by Councillor J. Gosling who objected to outside bodies dictating to the Council. He considered that the Electricity Committee had done everything in its power to serve the ratepayers. Referring to previous decreases in tariffs he said that these had been insisted upon by certain members of the Committee. The idea was to give the public the benefit of the undertaking.

Opposition came from Councillors F. Swindell and F. J. Clements, who claimed that there was a great deal of concern in the district regarding the undertaking, and other councillors thought that an investigation would dispel these criticisms, although Councillor C. G. Ashworth said that he had heard none in his area.

After Councillor Dean had replied that he did did not fear an investigation but thought the expense unnecessary the motion to rescind the previous resolution was defeated by nine votes to seven.

London.—DEARER LIGHTING.—Poplar Electricity Committee is seeking the consent of the Electricity Commissioners to increase the flat rate for lighting from 5·4d. to 6d. per kWh.

Southport.—A DIFFICULT YEAR.—Reporting to the Town Council on the working of the Electricity Department, Councillor J. J. Irvin, chairman of the Electricity Committee, said that they had had a difficult but fairly successful year.

The reduction in sales through fuel saving and other causes was 13 per cent. compared with the engineer's estimate of 10 per cent. in the early part of the year. Dealing with expenses, he said that coal for generating purposes cost under £1 per ton in 1939, while now the cost was 35s. 6d. Throughout the whole year, the first that Southport and Birkdale had worked as a complete entity, they had been trying to cut their coat according to their cloth. He was pleased to report that, financially, they had finished up on the right side, although at one time they did not expect to do so.

With regard to personnel, he said that they had to use all the staff at the showrooms to fill clerical posts, and girls from the cookery demonstration department had been transferred to meter testing.

TRANSPORT

Glasgow.—AVOIDING CONGESTION.—Important changes in Glasgow's transport system came into operation on Sunday, August 15th, with the object of eliminating congestion in the central areas of the city and cutting down long-distance services. Under the new arrangement only direct tram crossings are made at the city's busiest junction where Argyle Street is intersected by Union Street and Jamaica Street. Formerly trams turned from Jamaica Street into Argyle Street. Queueing at tram stops will be encouraged and new stopping places will be arranged. To speed up traffic, 125 of the older trams will be detailed for suburban services. All routes will be distinguished by numbers instead of the colour bands on the trams.

Leeds.—EXTENSION OF TIME.—The Minister of War Transport has made an Order extending by three years the time limited by Section 5 of the Leeds Corporation Light Railways (Extension) Order, 1935, as last extended in 1940, for the completion of the light railways authorised by Section 3 of the Order.

Nottingham.—TROLLEY-BUS EXTENSION.—Last year a public inquiry was held by the North Midland Regional Transport Commissioner (Mr. J. H. Stirk) on behalf of the Ministry of War Transport, in connection with an application by the Corporation for powers to extend the trolley-bus route to Wollaton (*Electrical Review*, October 30th, 1942, page 567). The Minister has since informed the Corporation that he is prepared to authorise the extension on certain conditions, the chief one being that the Midland General Omnibus Co., Ltd., and the Trent Motor Traction Co., Ltd., which operate over the route (and which opposed the application at the inquiry) should be given an interest in the service. Officials of the Corporation have met representatives of the two companies but have failed to agree to terms.

At a recent meeting of Wollaton residents the deputy town clerk (Mr. T. J. Owen) stated that the Corporation could not accept the terms but had informed the Minister that it was prepared to pay the companies any compensation he might stipulate.

It may be recalled that at the inquiry Mr. Ben England, general manager of the Nottingham City Transport Department, estimated that it would take 300 tons of coal a year to provide the service, and that 30,000 bus-miles would be saved in a year to the present operators. The extension would cost £2,762 for equipment and overhead gear, and £2,000 to provide electricity. The equipment necessary for the route was in stock and it was estimated that it would take two months to prepare the route, which was 1·3 miles long.

Imports of Iraq

25 per cent. Decrease in Value in 1941

THE value of the electrical import trade of Iraq in 1941 totalled 159,000 dinars (dinar= £1), a decline of nearly 25 per cent. on 1940, when requirements for works under the direct approval of the Government were relatively heavy.

In the accompanying table details are given of the values and leading countries of supply of the main items of the electrical trade, with a note of increases or decreases compared with 1940. It will be seen that the United Kingdom was by far the principal supplier and that the outstanding decreases were in machinery and telegraph or telephone cables.

In connection with the trade in dry batteries it is reported that the production of these articles in Palestine is now sufficient to cover all the requirements of the Middle East.

Description of Imports	1941 Dinars	Inc. or dec. Dinars
Dynamos, motors, convertors, transformers and choking coils for main distribution under Government approval—		
Total	2,400	− 12,700
From United Kingdom	1,400	− 13,700
„ Czechoslovakia	1,000	+ 1,000
Dynamos, etc., for other purposes—		
Total	7,500	− 1,100
From United Kingdom	5,200	− 1,300
„ United States	2,200	+ 1,200
Batteries, accumulators and plates for motor vehicles and vessels—		
Total	9,600	+ 400
From United Kingdom	4,600	+ 400
„ United States	5,000	+ 400
Pocket lamp batteries—		
Total	800	− 1,000
From United States	250	− 70
„ United Kingdom	400	− 490
„ India	60	− 170
Other accumulators and batteries—		
Total	6,400	+ 1,900
From United Kingdom	5,500	+ 2,200
„ United States	800	− 300
Electro-mechanical and domestic equipment, not exceeding 15 kg.—		
Total	350	− 950
From United Kingdom	240	− 470
„ United States	80	− 330
Heating units (resistances)—		
Total	430	+ 130
From United Kingdom	350	+ 150
Other, unspecified, electro-thermic apparatus—		
Total	320	+ 10
From United States	250	+ 220
Filament lamps and tubes—		
Total	9,500	+ 1,300
From United Kingdom	6,900	+ 2,300
„ Hungary	1,200	+ 700
Arc lamps—		
Total	1,100	− 100
From United Kingdom	20	− 330
„ Japan	1,000	+ 200
Other lamps—		
Total	170	− 230
Electro-medical apparatus—		
Total*	1,150	+ 150
Radio valves—		
Total	1,150	− 750
From United Kingdom	650	− 750
„ United States	380	+ 80
Radio receiving apparatus—		
Total	24,600	− 2,400
From United States	20,600	+ 6,600
„ United Kingdom	3,800	− 2,700
Other radio material—		
Total*	1,900	− 2,400
Telegraph and telephone apparatus—		
Total*	33,000	+ 10,500
Signalling apparatus—		
Total	1,800	− 1,500
Transmission cables—		
Total	700	− 800
Telegraph and telephone cables and wire for authorised public purposes—		
Total*	3,600	− 37,400
Ditto for other purposes—		
Total	18,800	+ 2,100
From United Kingdom	17,700	+ 5,200
Insulators—		
Total	2,200	− 4,300
From United Kingdom	1,700	− 2,100
Switch and regulating apparatus for main distribution under Government approval—		
Total	300	− 2,100
Ignition apparatus (except for aircraft, vehicles and ships)—		
Total	400	—
Meters—		
Total	4,400	− 3,600
From United Kingdom	3,700	− 3,500
„ France	600	+ 600
Electric fans—		
Total	6,100	− 16,900
From United States	500	− 13,000
„ United Kingdom	5,500	+ 700
Other electrical appliances and accessories—		
Total	20,800	+ 3,800
From United Kingdom	14,500	+ 1,500
„ United States	2,900	+ 800
„ Japan	1,900	+ 1,550

*Mainly from United Kingdom.

N.S.W. Hydro-electric Project

THE Premier of New South Wales, Mr. W. J. McKell, recently announced that the State Government had decided to appropriate £183,000 for the erection of a hydro-electric power station at Wyangala Dam, with transmission lines to Cowra and from Wellington to Dubbo. The total cost of the undertaking will be £275,000.

According to a report in the *Industrial Australian and Mining Standard*, Mr. McKell said that the scheme would be treated as urgent. It would assure to wartime projects and other industries in the area an adequate and economic supply of electricity, and it would make a further and permanent contribution to the well-being of rural communities and facilitate the decentralisation of industry. Completion of the plan would bring a reduction in the cost of electricity to residents in many towns, and confer the advantages of electric light and power upon hundreds of farmers and settlers.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Metal Industries, Ltd.—In the course of his speech at the company's annual meeting on August 13th the chairman (Sir J. Donald Pollock, Bt.) said that the profit for 1942-43 had risen by £85,110 to £264,794, due to the dividends paid by the company's subsidiaries. The holding of ordinary shares in Electrical Switchgear & Associated Manufacturers, Ltd., had been increased and the company now held 99 per cent. of the ordinary shares. The dividends received from this source arose mainly from Brookhirst Switchgear, Ltd., which had operated at a high level of activity during the year and had earned a satisfactory profit.

They now held all the ordinary share capital of the Igranic Electric Co., Ltd., and, with their consent, that company's preference shares had been converted into ordinary shares. The dividends received from this source already represented a very satisfactory return on their investment.

After further reference to the company's holdings, including that in the British Oxygen Co., Ltd., the chairman said that the completion of audited figures for the company took some time and it was not expected that, in future, it would be possible to announce their final ordinary stock dividends before the end of August at the earliest. They would continue, however, to pay the interim dividend on December 1st.

As already reported, the final dividend on the "A" and "B" ordinary stock is 5½ per cent., making 8 per cent. for the year.

Belliss & Morcom, Ltd., report a profit for the year to March 31st, after deducting depreciation, of £48,662. The dividend for the year is maintained at 14 per cent. by a final payment of 10 per cent., and the balance carried forward is £154,209 (against £150,352 brought in).

A. C. Cossor, Ltd., report that the profits for the year ended March 31st amounted to £97,058 after providing for income tax on all profits earned up to that date. The corresponding figure for 1941-42 was £66,676. It is proposed to pay a final dividend of 7 per cent., making 10 per cent. tax free for the year. This compares with the equivalent of 7½ per cent. tax free for the previous year when the final payment was 5 per cent. tax free and the interim 5 per cent. less tax. The balance carried forward is £76,193, an increase of £32,058.

During the past year the company acquired a 95 per cent. interest in Lancashire Cables, Ltd., and disposed on favourable terms of its wholly-owned subsidiary Sterling Batteries, Ltd.

Broadcast Relay Service, Ltd., reports that after providing for estimated E.P.T. the trading profit for the year to March 31st was £148,895, as compared with £164,548 before E.P.T. Preference reserve receives £11,525, replacements and contingencies £70,000, and directors' fees £1,931, leaving a net balance of £65,439 (against £107,037). The final ordinary dividend is 3½ per cent., making 7 per cent., tax free, for the year (against 10 per cent., less tax), and the balance carried forward is £28,083 (against £22,636 brought in). Agreement has not yet been reached regarding the liability to E.P.T.

The Nico Light Co., Ltd., reports a trading profit for the year ended March 31st of £13,617, as compared with £12,225 for the preceding year, and a net profit of £3,721 (against £3,953). The first and final dividend for the year is 7½ per cent., less tax, and the balance carried forward is £3,083 (against £1,391 brought in).

McMichael Radio, Ltd., has declared an interim dividend of 6 per cent. on the 8 per cent. participating preferred ordinary shares, representing arrears for the nine months to December 31st, 1936, and one of 4 per cent. in respect of arrears for the year ended December 31st, 1937.

The Cawnpore Electric Supply Corporation, Ltd., is again paying a final dividend of 7 per cent., maintaining the past year's distribution at 10 per cent.

The Northampton Electric Light & Power Co., Ltd., is again paying an interim ordinary dividend of 4 per cent., less tax.

The Rushden & District Electric Supply Co., Ltd., has declared an interim dividend of 4 per cent., less tax (unchanged).

The Engineering & Lighting Equipment Co., Ltd., is paying a final dividend of 6 per cent., again making 10 per cent. for the year.

New Companies

Dalyte Electrical Co., Ltd.—Private company. Registered July 26th. Capital, £9,000. Objects: To acquire the business carried on at Deco Engineering Works, West Row, W.10, by L. P. Palin and C. D. Barrett, as the Dalyte Electrical Co., and to carry on the business of electrical engineers, etc. Subscribers: K. J. S. Mellor, and Hilda Cusack, both of 66, Cheapside, E.C.2. Solicitors: Wild, Collins and Cresse, 66, Cheapside, E.C.2.

Shalask Electric Trading Co., Ltd.—Private company. Registered August 7th. Capital, £200. Objects: To carry on the business of manufacturers of and dealers in electrical fittings, lamps, batteries, torches, bulbs, radio valves and accessories, etc. Miss Hannah Levy, 49, Listria Park, N.16, is the first director. Solicitors: Frank E. Fine & Co., 62, Oxford Street, W.1.

British Electric Service Co., Ltd.—Private company. Registered in Edinburgh July 27th. Capital, £1,000. Objects: To acquire the business of the British Electric Service Co., 51, Cadogan Street, Glasgow, radio engineers, etc. Directors: M. J. Clark, 51, Cadogan Street, Glasgow and L. H. Scott, 27, St. Vincent Crescent, Glasgow.

Wilsons (Radio and Electrical), Ltd.—Private company. Registered July 27th. Capital, £1,000. Objects: To acquire the business of dealers in radio and electrical apparatus and equipment carried on by L. R. Wilson and.

E. L. Silverstone at 7, Corporation Street, Manchester, 4, as Wilsons. Directors: L. R. Wilson, 28, Ravensway, Prestwich and E. L. Silverstone, 6, Ballbrook Avenue, Manchester, 20. Registered office: 7, Corporation Street, Manchester, 4.

Austerity Radio, Ltd.—Private company. Registered July 26th. Capital, £2,000. Objects: To carry on the business of radio engineers, manufacturers of and dealers in gramophones, wireless and electrical components, accessories and equipment, etc. F. H. Wilson, 19, Fourland Walk, Edgware, Middlesex, is the first director. Solicitor: M. J. H. Leverton, 202, Bishopsgate, E.C.2.

Dudley Electrical (Wholesale) Supplies, Ltd.—Private company. Registered August 9th. Capital, £3,000. Objects: To acquire the business of electrical merchants carried on by L. Bunce and J. Holland at 88a, High Street, Dudley. Directors: L. Bunce, 50, Graybourne Road, Dudley Wood, Worcs., and J. Holland, 37, Carlyle Road, Edgbaston, Birmingham. Registered office: 88a, High Street, Dudley, Worcs.

George Frye (Relay), Ltd.—Private company. Registered August 3rd. Capital, £1,000. Objects: To acquire the business of a manufacturer of and dealer in and agent for broadcast rediffusion and radio equipment, carried on by G. Frye, at 5, Dumfries Place, Cardiff, etc. Directors: G. Frye, 270, Newport Road, Cardiff, and Maybel Phillips, 9, Coronation Road, Abertillery, Mon. Registered office: 75-77, Audrey House, Ely Place, E.C.1.

Arthur A. Lightbody, Ltd.—Private company. Registered in Edinburgh August 3rd. Objects: To carry on the business of electrical contractors, public works contractors, builders, plasterers, etc. Directors: A. S. Lightbody, 224, Wilton Street, Glasgow, Miss V. Knox, 24, Kingsborough Gardens, Glasgow, and J. B. Teale, 76, Victoria Park Drive, Glasgow. Registered office: 481, Great Western Road, Glasgow.

T.H.L. Plastics, Ltd.—Private company. Registered July 30th. Capital, £5,000. Objects: To carry on the business of manufacturers of and wholesale and retail dealers in plastics, etc. Directors: T. H. Lawley, J. Black and Olive M. Hackett, all of 13, Lower Park Drive, S.W.15. Registered office: 33, St. James Street, S.W.1.

Companies' Returns

Statements of Capital

Celestion, Ltd.—Capital, £123,100 in £1 shares (37,500 preference and 85,600 ordinary). Return dated January 13th, 1943 (filed June 5th, 1943). 35,721 preference and 25,651 ordinary shares taken up. £51,408 paid. £9,964 considered as paid. Mortgages and charges: £83,076.

Electro Mechanical Supplies, Ltd.—Capital, £3,000 in £1 shares (2,000 ordinary and 1,000 preferred ordinary). Return dated December 23rd, 1942 (filed June 9th, 1943). 2,500 shares taken up. £2,500 paid on 1,500 ordinary and 1,000 preferred ordinary. Mortgages and charges: Nil.

Zenith Electric Co., Ltd.—Capital, £26,250 in 25,000 ordinary shares of £1 and 25,000 deferred shares of 1s. Return dated February 5th, 1943. 25,000 ordinary and 23,334 deferred shares taken up. £5,563 paid on 5,563 ordinary shares. £20,603 14s. considered as paid on 19,437 ordinary and 23,334 deferred shares. Mortgages and charges: Nil.

Ellis & Ward, Ltd.—Capital, £10,000 in 2,000 preference and 8,000 ordinary shares of £1. Return dated January 20th (filed March 1st), 1943. 1,000 preference and 6,003 ordinary shares taken up. £1,003 paid on 3 ordinary and 1,000 preference. £6,000 considered as paid on 6,000 ordinary shares. Mortgages and charges: Nil.

National Electrical Supplies Co., Ltd.—Capital, £3,000 in 2,000 preference shares of £1 and 10,000 ordinary shares of 2s. Return dated May 11th, 1943. 1,000 preference and 4,200 ordinary shares taken up. £1,420 paid. Mortgages and charges: Nil.

Willans & Robinson, Ltd.—Capital, £100 in £1 shares. Return dated January 11th (filed April 5th), 1943. 2 shares taken up. £2 paid. Mortgages and charges: Nil.

Sheffield Electric Power Co., Ltd.—Capital, £2,000 in £1 shares. Return dated December 2nd, 1942 (filed March 25th, 1943). 2 shares taken up. £2 paid. Mortgages and charges: Nil.

Nivalight (1928), Ltd.—Capital, £5,000 in 5,000 shares of £1 each. Return dated March 24th, 1943 (filed June 29th, 1943). All shares taken up. £5,000 paid. Mortgages and charges: £5,000.

Moreland Electric Welding Co., Ltd.—Capital, £4,000 in £1 shares. Return dated December 22nd, 1942 (filed March 23rd, 1943). 2,302 shares taken up. £2,302 paid. Mortgages and charges: Nil.

Great Asby Electric Light & Water Co., Ltd.—Capital, £2,000 in £5 shares. Return dated February 13th, 1943. 282 shares taken up. £1,410 paid. Mortgages and charges: Nil.

Cressall Manufacturing Co., Ltd.—Capital, £15,000 in £1 shares. Return dated February 9th, 1943. 9,000 shares taken up. £9,000 considered as paid. Mortgages and charges: Nil.

Mortgages and Charges

Unit Controls, Ltd.—Debenture dated July 25th, 1943, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., charged on the company's undertaking and property, present and future, including uncalled capital.

Cray Electrical Motors, Ltd.—Satisfaction in full on May 31st, 1941, of debentures dated December 5th, 1939, and June 3rd, 1940, and registered December 15th, 1939, and June 7th, 1940, securing £1,550 and £4,000 respectively. (Notes filed August 7th, 1943.)

F. Bradley, Ltd.—Satisfaction in full on July 9th of (1) charge dated January 27th, 1942, and registered February 13th, 1942, and (2) debentures dated January 8th, 1942, and registered January 21st, 1942, securing £750.

Altrincham Electric Supply, Ltd.—Satisfaction to the extent of £20,000 (balance) on July 20th of charge registered July 22nd, 1939.

STOCKS AND SHARES

TUESDAY EVENING.

It is clear that holiday influences have begun to make their effect noticeable in Stock Exchange markets, where something of a halt has been called to the flow of business which, up to the present, had been surprisingly good considering the time of year. In certain directions, prices show a tendency to droop after their long continued advance. The absence of Mr. Churchill makes an additional reason for caution on the part of investment. The knowledge that the war effort stands at a point where important developments may occur at any moment adds another element of restraint upon Stock Exchange activity.

London Transport "C"

Buying which raised to 70 the price of London Passenger Transport "C" stock, was based on the expectation that the Board would pay, after the war, a substantially higher dividend than the present 3 per cent. Some people are looking for a 5 per cent. distribution, which seems to be taking a rosy view of the prospect for, at any rate, a number of years ahead. At the current rate of dividend the yield on the money is very small by comparison with that obtainable from investment in some of the other Home Railway junior stocks. But capital nowadays is so keen on securing investments which carry a prospect of post-war appreciation that a further advance in the price of Transport "C" is at any rate possible.

A Public Board?

Another consideration which weighs with the present supporters of Transport "C" stock is the impression that the Board will eventually take rank with the Metropolitan Water Board, the Central Electricity and similar bodies whose stocks carry the cachet of being gilt-edged in character. Should the Board's stocks, including the "C" issue, be given the rank of Public Boards' securities, it is conceivable that current prices are warranted.

Southern Railway 5 per cent. preferred stock is a harder market at 78. British Electric Traction deferred has gained 25, rising to 1100. Thomas Tillings are up 1s. at 55s.

Electricity Supply

Rises of sixpence a share do not sound of any consequence, but when these occur in the Home Electricity ordinary list, they usually imply that there are very few shares about. In four cases quoted this week this is what has happened, but so persistent is the buying demand that the would-be purchasers refuse to be deterred from their purpose by the raising of prices. London Associated Electrics are a florin higher, at 24s., purely on post-war prospects. The company paid 3 per cent. last year and did not fully earn it.

In the Overseas group, Jerusalem Electrics are better at 29s. 6d., on the hope, previously reflected, that the dividend will be restored to 7 per cent. Perak Hydro-Electrics have hardened to 10s., the American successes in the Pacific having encouraged a measure of support. Victoria Falls ordinary hold all their previous gain at 4¼.

Equipment and Manufacturing

No sign of relinquishing their strength is to be seen in the market for equipment and manufacturing companies' shares. Once again, improvements are general. British Insulated are up $\frac{1}{16}$, Callender's 1s. and Associated Electrical 6d. Chief honours are secured by Reyrolle shares, which have gained 2s. 6d. at 70s. British Aluminium are up to 49s. 9d., British Thermostat to 19s. Mather & Platt have advanced to 50s. Vactrics rose a further 3d. to 14s. 9d.; a dividend on the ordinary is anticipated with confidence. At 56s. 3d. Automatic Telephones are 9d. down, and amongst the heavy shares, Vickers lost a few pence at 19s. 3d. Telephone Rentals eased off to 10s. 9d. Murex shed $\frac{1}{2}$, to 5½.

British Insulated

The consistent manner in which the price of British Insulated Cables ordinary shares has been advancing gives rise to an inquiry as to what may be the likelihood of an increase in the dividend on these shares. A couple of months ago, Callender's raised their previously-paid 15 per cent. dividend to 20 per cent., and it is common knowledge, of course, that all the companies engaged in the cable industry are doing extremely well at the present time. British Insulated distributed a capital bonus of 20 per cent. in respect of the year ended December 31st, 1936. Since then, that is, in the last six years, the annual dividend has been 20 per cent., of which 5 per cent. has been declared as a bonus. The issued ordinary share capital is now £2,000,000 and at the present price of 5$\frac{7}{16}$ the yield on the money gives £3 13s. 6d. per cent. The company is extremely strong financially, and the 20 per cent. distribution has been paid for years past out of earnings which show a substantially higher rate on the ordinary shares.

Henley's

The dividend record of W. T. Henley's Telegraph Works Co., Ltd., is not unlike that of British Insulated Cables. The company distributed an additional bonus in 1936; since that year the annual distribution has been 20 per cent., of which 5 per

(*Continued on page* 255)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Aug. 17	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	57/–	..	4 7 10
British Power and Light	6	7	31/6	+6d.	4 9 0
City of London	7	7	27/6	..	5 1 10
Clyde Valley	8	8	39/6	+6d.	4 1 0
County of London	8	8	39/6	+6d.	4 1 0
Edmundsons:					
7% Pref.	7	7	34/–	..	4 2 4
Ord.	6	6	28/6	..	4 4 3
Elec.Dis.Yorkshire	9	9	44/–	..	4 1 10
Elec. Fin. and Securities	12½	12½	52/–	..	4 16 1
Elec. Supply Corporation	10	10	46/–	..	4 7 0
Isle of Thanet	Nil	Nil	17/–	..	—
Lancs. Light and Power	7½	7½	34/6	..	4 7 0
Llanelly Elec.	5½	6	25/6	..	4 14 1
Lond.Assoc.Electric	4	3	24/–	+2/–	2 10 0
London Electric	6	6	26/6	..	4 10 7
London Power Red. Deb.	5	5	104½	..	4 15 7
Metropolitan E.S.	8	8	40/–	+6d.	4 0 0
Midland Counties	8	8	38/6	..	4 3 1
Mid. Elec. Power	9	9	42/6	..	4 4 9
Newcastle Elec.	7	7	31/–	..	4 10 5
North Eastern Elec.:					
Ordinary	7	7	32/–	..	4 7 6
7% Pref.	7	7	34/–	..	4 2 4
Northampton	10	10	47/6	..	4 4 0
Notting Hill 6% Pref. (£10)	6	Nil	10	..	—
Northmet Power:					
Ordinary	7	7	36/6	..	3 16 8
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	26/–	..	4 12 4
Scottish Power	8	8	37/6	..	4 5 4
Southern Areas	5	5	22/–	..	4 10 11
South London	7	7	26/–	..	5 7 8
West Devon	5	5	23/–	..	4 7 0
West Glos.	4½	3½	23/6	..	2 19 7
Yorkshire Elec.	8	8	39/6	..	4 1 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	5/6	..	—
Calcutta Elec.	7*	6*	38/6	..	3 2 4
Cawnpore Elec.	10	10	34/6	..	5 16 0
East African Power	7	7	33/6	..	4 3 7
Jerusalem Elec.	7	5	29/6	+6d.	3 8 0
Kalgoorlie (10/–)	5	5	10/–	+6d.	5 0 0
Madras Elec.	6*	4*	25/–	..	—
Montreal Power	1½	1½	29	..	5 3 5
Palestine Elec."A"	4*	5*	42/–	..	2 7 8
Perak Hydro-elec.	6	7	10/–	+6d.	—
Shawinigan Power	83cts.	90cts.	19½	..	—
Tokyo Elec. 6%	6	6	22	..	—
Victoria Falls Power	15	15	4½	..	3 10 7
WhitehallInv.Pref.	—	—	25/–	..	4 0 0

Company	Dividend Previous	Dividend Last	Middle Price Aug. 17	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity:					
1955–60 (Civil Defence)	—	3	99½	..	3 0 4
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	102	..	3 8 8
1974–94	3½	3½	100	..	3 5 0
London Elec. Trans. Ltd.	2½	2½	97	+½	2 11 3
London & Home Counties 1955–75	4½	4½	110	..	4 1 10
Lond.Pass.Trans.:					
A	4½	4½	117½	..	3 16 7
B	5	5	115½	..	4 6 7
C	2¾	3	70	..	4 5 9
WestMidlandsJ.E.A. 1948–68	5	5	110	..	4 11 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	115½	–1	5 4 0
Def.	1½	1½	29	..	5 3 5
Anglo-Portuguese	8	8	24/–	..	6 13 4
Cable & Wireless:					
5½ Pref.	5½	5½	113	–2	4 17 4
Ord.	4	4	77	–1	5 4 0
CanadianMarconi$1	Nil	4cts.	10/6	+1/–	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	36/6	+6d.	2 14 7
Pref.	6	6	29/–	..	4 2 9
Great Northern Tel. (£10)	Nil	Nil	24½	..	—
Inter. Tel. & Tel.	Nil	Nil	17	..	—
Marconi-Marine	7½	7½	32/9	+1/–	4 11 7
Oriental Tel. Ord.	16	10	44/–	+1/–	—
Telephone Props.	6	Nil	14/6	..	—
Tele.Rentals (5/–)	10	10	10/9	–3d.	4 13 0
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	4/–	..	—
4% Inc.	Nil	Nil	10	..	—
Brit.Elec.Traction:					
Def. Ord.	45	45	1100	+25	4 1 9
Pref. Ord.	8	8	175	..	4 11 5
Bristol Trams	10	10	50/–	..	4 0 0
Brazil Traction	$½	$1	28½	–½	—
Calcutta Trams	8	5½	41/9	..	2 12 6
Cape Elec. Trams	5	6	25/6	..	4 14 0
Lancs. Transport	10	10	44/3	..	4 10 4
Mexican Light:					
1st Bonds	5	5	107½	..	4 13 0
Rio 5% Bonds	5	5	105½	+1	4 14 9
Southern Rly.:					
5% Prefd.	5	5	78	+2	6 8 2
5% Pref.	5	5	111	..	4 10 0
T. Tilling	10	10	55/–	+1/–	3 12 9
West Riding	10	10	43/6	..	4 12 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Aug. 17	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron.Elec.Ord. ..	7½	10	42/6	..	4 14 0
Assoc. Elec. :					
Ord.	10	10	49/–	+6d.	4 1 6
Pref.	8	8	38/–	..	4 4 3
AutomaticTel.&Tel.	12½	12½	56/3	−9d.	4 9 0
Babcock & Wilcox	11	11	48/3	..	4 11 5
British Aluminium	10	10	49/9	+9d.	4 0 4
British Insul. Ord.	20	20	5 7/16	+ 1/16	3 13 6
British Thermostat (5/–)	18½	18½	19/–	+6d.	4 17 4
British Vac.Cleaner (5/–)	15	30	27/6	..	5 9 1
Brush Ord. (5/–)	6	8	8/3	..	5 0 0
Burco (5/–) ..	15	15	14/3	..	5 5 1
Callender's ..	15	20	99/–	+1/–	4 1 0
ChlorideElec.Storage	15	15	82/6	..	3 13 0
Cole, E. K. (5/–)	7	10	25/6	..	1 19 2
Consolidated Signal	17	24	5 7/8	..	4 8 3
Cossor, A. C. (5/–)	7½•	10•	24/3	+3d.	2 1 3
Crabtree (10/–) ..	17½	17½	38/–	..	4 12 4
Crompton Parkinson Ord. (5/–) ..	20	20	26/–	..	3 17 0
E.M.I. (10/–) ..	6	6	27/–	−6d.	2 4 8
Elec.Construction	10	12½	47/6	..	5 5 3
Enfield Cable Ord.	12½	12½	59/–	+6d.	4 4 9
Elecl.Switchgear (10/–)	10	10	20/–	..	5 0 0
English Electric	10	10	48/–	..	4 3 4
Ensign Lamps (5/–)	25	25	21/3	..	5 17 8
Ericsson Tel. (5/–)	22•	20•	47/6	..	2 2 2
Ever Ready (5/–)	40	40	39/–	+6d.	5 2 7
Falk Stadelmann	7½	7½	31/–	−6d.	4 16 9
Ferranti Pref. ..	7	7	28/9	..	4 17 5
G.E.C. : Pref. ..	6½	6½	32/–	..	4 1 3
,, Ord. ..	17½	17½	89/–	..	3 18 8
Greenwood&Batley	15	15	38/6	..	7 15 10
HallTelephone(10/–)	12½	12½	25/3	..	4 19 0
Henley's (5/–) ..	20	20	26/–	..	3 17 0
4½% Pref. ..	4½	4½	23/–	..	3 18 3
Hopkinsons ..	15	17½	64/6 ●	..	5 8 6
India RubberPref.	5½	5½	21/–	..	5 4 9
Intl. Combustion	30	30	6½	..	4 17 10
Johnson & Phillips	15	15	69/6	..	4 7 2
Lancashire Dynamo	20	22½	92/9	..	4 17 0
Laurence,Scott(5/–)	15	12½	12/–	..	5 4 2
London Elec. Wire	7½	7½	31/6	..	4 15 3
Mather & Platt .	10	10	50/–xd	+ 1/4	4 0 0
Met.Elec.Cable Pref.	5½	5½	21/3	..	5 3 6
Murex	20	20	5½	−½	3 18 0
Pye Deferred (5/–)	25	25	25/–	..	5 0 0
Revo (10/–) ..	17½	17½	38/9	..	4 10 3
Reyrolle ..	12½	12½	70/–	+½	3 11 5
Siemens Ord. ..	7½	7½	32/3	..	4 13 0
Strand Elec. (5/–)	4	7½	7/3	..	5 3 5
Switchgear & Cowans (5/–) ..	10	20	15/6	..	6 9 0
T.C.C. (10/–) ..	5	5	18/9	..	2 13 4
T.C. & M. ..	10	10	52/–	..	3 17 1
TelephoneMfg.(5/–)	9	9	12/–	..	3 15 0
Thorn Elec. (5/–)	20	20	21/9	+3d.	4 12 0
Tube Investments	20	20	91/6	+6d.	4 7 4
Vactric (5/–) ..	Nil	Nil	14/9	+6d.	—
Vickers (10/–) ..	10	10	19/3	−3d.	5 4 0
WalsallConduits(4/–)	55	55	43/6	..	5 1 2
Ward & Goldstone (5/–)	20	20	23/9	..	4 4 2
WestinghouseBrake	10	12½	65/–	..	4 0 0
West, Allen (5/–)	7½•	7½	7/6	..	5 0 0

• Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 253)

cent. is declared as bonus. Here again the earnings for years past have been substantially higher than the amount distributed in dividend and the company's financial standing is very strong. The issued ordinary stock capital is £1,300,000 in 5s. units. There is also an issue of £200,000 in 4½ per cent. preference £1 units, the price of which is 23s.

Cossor Profits

A. C. Cossor have declared a final dividend of 7 per cent., tax free, making 10 per cent., tax free, for the year to March 31st last. This is an improvement of 2½ per cent. net as against the previous year. The profits for the year are £30,000 up and the price of the shares improved to 25s. before reverting to 24s. 3d. It will be remembered that the previous chairman, Sir Louis Sterling, resigned from the board some five months ago owing to negotiations which were then in progress with another company for agreement of interests. The present chairman is Mr. T. A. Macauley.

Radio shares have been a quieter market on the whole, speculation in E.M.I. ordinary having subsided to some extent: the price shows a fall of 6d. at 27s. Other members of the radio group are attracting no particular attention. Ever Ready shares hardened to 39s. as if in recognition of the shortening hours of daylight. Rumour has linked the Ever Ready Co. with A. C. Cossor as a possible partner in business, and this report now takes precedence of the previous Cossor–Philco gossip.

Miscellaneous Matters

Cable & Wireless preference at 113 shows a loss of 2 points, and the ordinary is 1 down at 77. Apart from these declines, the cable group is firm. Oriental Telephones, Marconi Marines and Canadian Marconi are all 1s. to the good, and Globe ordinary, in spite of Cable & Wireless falls, hardened to 36s. 6d. Dollar stocks in this week's price-lists have moved narrowly. Brazilian Tractions went back to 28¾, showing a fall of ½ on balance. Lisbon Trams at 29s. 6d. are unaffected by the issue of the accounts and the chairman's statement. According to a law passed last April, public utility undertakings in Portugal are apparently to be nationalised, but the regulations have not yet been published.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AKT.-GES. Brown, Boveri & Cie.—"Multi-break gas-blast circuit breakers." 12558/42. September 27th, 1941. (Addition to 530971.) (554967.)

Aktiebolaget Avaror.—"Tools for cutting the protective covering of conductor cables." 1157/42. February 5th, 1941. (555009.)

Associated Electric Laboratories, Inc.—"Electrical control systems." 1161/42. January 31st, 1941. (555011.)

J. T. Boardman, C. H. Last and Metropolitan-Vickers Electrical Co., Ltd.—"Flameproof rheostatic and like resistances for use in mines." 10264. July 22nd, 1942. (Addition to 506529.) (554962.)

British Electricon (London), Ltd., and W. A. Chambers.—"Detection or determination of the quantity of suspended solid matter in gas streams." 1093. January 26th, 1942. (554985.)

British Thomson-Houston Co., Ltd.—"Methods of activating cathodes for electric discharge devices." 5778/42. April 30th, 1941. (554958.) "Electrical protective systems." 1218/42. January 30th, 1941. (554987.) "High-voltage X-ray apparatus." 2093/42. February 18th, 1941. (555013.)

Burgess Battery Co.—"Dry cell and battery and method of making the same." 6261/42. April 30th, 1941. (555047.)

Commercial Cable Co.—"Submarine cable signalling system." 9210/42. July 10th, 1941. (555029.)

Express Lift Co., Ltd., and W. A. Dixie.—"Winding gear for lifts and the like." 977. January 23rd, 1942. (554945.)

General Cable Corporation.—"Lead alloys." 1092/42. March 29th, 1941. (554984.)

Hackbridge Electric Construction Co., Ltd., and J. H. Mills.—"Geneva mechanisms." 5246. April 20th, 1942. (555019.)

H. M. Harmer.—"Regulating means for electrical circuits." 16500. December 22nd, 1941. (555004.)

J. A. Kinnaird.—"Rotary gear pumps." (Cognate applications 2978/42 and 7535/42.) March 6th, 1942. (554993.)

Marconi's Wireless Telegraph Co., Ltd., and H. J. H. Wassell.—"Calibration of master oscillators." 1153. January 27th, 1942. (555008.)

S. R. Mullard and C. F. M. Hayes.—"Dry cells or batteries and methods of assembling same." 7259/43. January 16th, 1942. (Divided out of 554926.) (554997.)

Northern Aluminium Co., Ltd., and V. Simon.—"Protection of polyphase alternating current or multi-wire direct current circuits or systems against failure of current in the supply lines." 822. January 20th, 1942. (555036.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—"Blocking layer rectifiers." 11661. September 11th, 1941. (554972.) "Incandescent cathode rectifiers more particularly for use in rectifying ultra-high frequencies." 16372. December 18th, 1941. (554977.)

Philips Lamps, Ltd., and C. W. V. Davis.—"Magnetic cleaning device." 2300. February 20th, 1942. (554948.)

A. Reyrolle & Co., Ltd., and R. W. Wild.—"Liquid insulated electric circuit breakers." 979. January 23rd, 1942. (554982.)

T. Ryle and J. Murphy.—"Devices for controlling the temperatures of apparatus for heating, cooking, baking or the like." 1248. January 29th, 1942. (555012.)

Standard Telephones & Cables, Ltd.—"Thermionic valve voltmeter arrangements and their application to measurements on electrical circuits." 5888/42. April 25th, 1941. (554959.) "Rochelle salt piezo-electric crystal apparatus." 10370/42. June 10th, 1941. (554963.) "Modulation system employing velocity modulated electron discharge tubes." 1013/42. January 28th, 1941. (555005.) "Magnetic coils and arrangements utilising the same." 4164/42. January 10th, 1941. (555015.) "Gain control receiving circuits for signalling systems." 5887/42. February 19th, 1941. (555020.)

A. H. Stevens (Electronic Laboratories, Inc.).—"Electrical systems for transforming direct current into alternating current." 3619. March 18th, 1942. (554953.)

Thermal Syndicate, Ltd., and G. N. Peel.—"Process for the manufacture of refractory articles." 4186. March 30th, 1942. (554955.)

Westinghouse Electric International Co.—"Electric circuit breakers." 5995/42. May 3rd, 1941. (555021.)

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of August 11th:—

MARTINDALE. No. 623,464, Class 7. Commutator grinding stones, being parts of machines.—Martindale Electric Co., Ltd., Westmorland Road, London, N.W.9.

SILON. No. 622,199, Class 9. Electric wire, cables, connections, conduits and conductors.—F. D. Sims, Ltd., Hazelhurst Works, Regent Street, Ramsbottom, Lancs. (By consent.)

SECOMAK. No. 622,522, Class 9. Cleaning apparatus (blower and suction), buzzers, sirens, switchgear and switchboards, all being electrical goods. Also No. 622,521, Class 7. Machine tools, pumping machinery, electrically driven pumps (not for scientific purposes or air pumps for vehicles), electric motors (not for land vehicles), and dynamos.—Service Electric Co., Ltd., Abbey Estate, Mount Pleasant, Alperton, Middlesex.

GOBLIN. No. 623,078, Class 12. Bicycles.—British Vacuum Cleaner & Engineering Co., Ltd., Goblin Works, Ermyn Way, Leatherhead, Surrey.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—COMMONWEALTH.—P.M.G.'s Department. September 2nd. Submarine telegraph cable; Schedule C.4186. September 14th. Lead-covered, multiple twin switchboard cable; Schedule C.4177.

NEW SOUTH WALES.—October 27th. Sydney County Council. Steam generating plant, Pyrmont power station (Section B); Specification 650. 50,000-kW steam turbo-alternator; Specification 651.

Manchester.—September 4th. Corporation. Two electrically driven centrifugal pumps with automatic switch and starting gear, pipes, valves, etc. Secretary, Waterworks Office, Town Hall, Manchester, 2.

Newcastle-on-Tyne.—City Council. Electrical repairs to houses on the various Corporation estates. Plans by the city architect, 18, Cloth Market, Newcastle-on-Tyne.

Orders Placed

Australia.—The following acceptances of tenders were reported in the May 20th and 27th issues of *Tenders* (Melbourne):—

COMMONWEALTH.—Department of Supply and Shipping. Fuse handles and bases (£530).—Siemens (Aust.) Pty., Ltd. Reflectors (£998).—British General Electric Pty., Ltd. Lamps, Sch. 3994/4: Australian General Electric Co. Pty., Ltd. (£4,586); British General Electric Co. Pty., Ltd. (£4,586). Lead-acid batteries, Sch. 67369: George L. Thompson Pty., Ltd. (£7,491); Vesta Battery Co., Ltd. (£1,603); Clyde Engineering Co., Ltd. (£4,631); Exide Batteries of Aust., Ltd. (£10,551); Century Storage Battery (£11,897); Victor Battery Co. (£9,929).

P.M.G.'s Department. Testing instruments, electrical indicating meters, Sch. 3761 (£482, plus exchange).—Siemens (Aust.) Pty., Ltd. Coaxial cable, Sch. 43/1466 (£2,560, plus exchange).—British Insulated Cables, Ltd. (through High Commissioner, London).

WESTERN AUSTRALIA.—Government Tender Board. Optical pyrometer (£101).—Birmingham Electric Furnaces, Ltd.

VICTORIA.—State Railways. Conduit pipes and fittings, Sch. 86: Various companies, including British General Electric Co. Pty., Ltd., Siemens (Aust.) Pty., Ltd., and Johnson & Phillips, Ltd. Fuses and switches, Sch. 83: Various companies, including British G.E.C. Pty., Ltd.

Northumberland. — Education Committee. Accepted. Additional electrical services at the Ashington Hirst Senior School canteen (£92).—A. Haggerty.

South Shields.—Corporation. Accepted. Portable X-ray apparatus.—Cuthbert Andrews.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alcester.—Additions, Grammar School (£3,000); governors.

Bishop Auckland.—British Restaurant for the U.D.C. (£2,000); E. Pye & Sons, builders, Bishop Auckland.

Blackpool.—Temporary houses, Lostock Gardens, and two school kitchens; borough engineer.

Blyth.—Central kitchen for schools; borough engineer.

Brighouse.—Houses, Bailiffe Bridge; J. Jagger & Sons, builders, Bradford Road, Bailiffe Bridge.

Chatham.—Central British Restaurant; R. L. Honey, borough architect, Town Hall.

Clydebank.—Houses for Corporation; burgh surveyor.

Coventry.—Nursery, Stretton (£4,300); city engineer.

Crewe.—Village hall at Madeley (£4,000); W. H. Sant, Birches Farm, Madeley, near Crewe.

Eccles.—Offices for fire guards and electrical work, 152/154, Church Street; T. Elce, borough engineer, Town Hall.

Felling-on-Tyne.—Flooring compound factory at old colliery offices; Durastic Bitumen Compounds, Ltd., 21, Beaumont Terrace, Jarrow, Co. Durham.

Gateshead.—Shelters at St. Mary's Infants' School; J. Sutton & Son, builders.

Canteen, North Eastern Trading Estate; A. V. Clerey & Sons, 14, Frederick Street, Sunderland.

Canteen; Wright Anderson & Co., Ltd.

Lancashire.—Central kitchen, Ashton-in-Makerfield, and meals centre, Stocks Terrace, Flixton; L. Evans, county architect, County Buildings, Fishergate Hill, Preston.

Ludlow.—Farm workers' houses (£13,819), Caynham, Stoke St. Milburgh, Acton Scott and Hope Bowdler, for R.D.C.; Intrade, Ltd., builders, Northleach, Glos.

Macclesfield.—Alterations to borough police station and erection of sub police stations on selected sites; M. A. Tetlow, borough architect, Pear Tree House, Jordangate, Macclesfield.

Manchester.—Café, bakehouse and kitchen, 17, Port Street; Smith & Robinson, Ltd., bakers and confectioners, 127, Stockport Road, Levenshulme, Manchester, 19.

Food factory, shop and lecture hall; P. Cummings, architect, 3, Appleby Lodge, Wilmslow Road, Rusholme, Manchester, 14.

Newcastle (Staffs).—Business premises, Market Square, for Debenhams, Ltd., London; T. Overbury, architect, Rodney Lodge, Rodney Road, Cheltenham.

Newport Pagnell.—Houses for farm workers for R.D.C.; McCulloch & Lett, builders, Olney, Bucks.

Preston.—Catholic Church, Sharoe Green Road, Broughton, Preston; Priest-in-Charge, Catholic Church, Broughton, Preston.

Ramsbottom.—Public baths for U.D.C.; A. Plunkett, surveyor, Council Offices, Ramsbottom, near Bury, Lancs.

Ripon.—Schools feeding centres; P. N. Molyneux, city engineer, Town Hall.

Scarborough.—Additions to school meals scheme; borough engineer.

Sheffield.—Alterations to Fir Vale Institution for additional accommodation for nurses; Public Works Department, Worthing Road, Sheffield, 9.

Silksworth Colliery. — Canteen ; D. & J. Ranken, Ltd., Stockton Road, Sunderland.

Stafford.—Houses for farm workers at Stych Lane, The Hanyards; H. Poole & Sons, Ltd., builders, Newcastle Street, Stone.

Houses, Norbury; Tideswell Bros., builders, Hollins Street, Shelton.

Headquarters for local branch, British Legion; W. Wallace Copland, British Legion Club, Stafford.

Stretford.—Works additions, Fraser Road; Wood Straw Co., Ltd.

Tyldesley.—Headquarters, Elliott Street; secretary, British Legion Club, Tyldesley, Manchester.

Warrington.—Tannery extensions, Winnick Street; Winnick Street Tannery, Ltd.

Warwick.—Additions to Memorial Sanatorium, Hertford Hill; Secretary, Warwickshire and Coventry Joint Committee for Tuberculosis, 6, The Quadrant, Coventry.

Warwickshire.—School huts, Castle Bromwich and Solihull (£4,200), and maternity home, Stratford-on-Avon (£5,000); county architect, Warwick.

West Sussex.—Maternity accommodation, Horsham and Chichester (£14,400); county architect, Chichester.

Gauge and Toolmakers' Association

THE Council of the Gauge & Toolmakers' Association has issued its first annual report covering the administrative year August, 1942, to August, 1943, which will be submitted at the annual meeting to be held at St. Ermin's Hotel, London, S.W.1, on September 1st. In it Mr. F. W. Halliwell, the chairman, says that since the incorporation of the Association in August, 1942, the membership has steadily increased and now totals 75. The Association has established and maintained close contact with various Ministries and Government Departments, and it receives advance copies of all Statutory Rules and Orders dealing with matters which may affect the industry. Information regarding various sections of the industry has from time to time been supplied to interested Directorates and several requests for direct assistance from various Departments have been dealt with satisfactorily.

A policy of co-operation with other organisations having similar or allied interests has been followed and friendly relations have been established with the Machine Tool Trade Association. The G.T.M.A. is subscribing annually to the work of the British Standards Institution and official representation on any B.S.I. committees considering matters of interest to the industry is now having the attention of the Council. In June a meeting was held under the auspices of the British Engineers' Association at which were present representatives of a number of trade organisations interested in various branches of mechanical engineering. The purpose of this meeting was to consider the establishment of a joint body under the aegis of the B.E.A. to represent the whole of the mechanical engineering industry in those matters where common interests of the whole were predominant. The G.T.M.A. was represented at this meeting and the Council is maintaining contact with the B.E.A. on this question. Application for membership of the F.B.I. has been accepted and the Association has two representatives on the Grand Council.

In February the Council of the Association set up a representative committee to review the whole position with regard to existing screw gauge prices and consider the question of establishing a uniform price list acceptable to all concerned. The Council adopted the recommendation of this committee to publish as Association prices a standard and non-standard price list prepared by the committee and these price lists have now been submitted to the Directorate of Gauges and Measuring Instruments, Machine Tool Control, Ministry of Supply. The work of the Screw Gauge Committee has since been extended to cover other questions connected with screw gauges.

Condenser Cleaning

INTERMITTENT chlorination of the cooling water for the condensers at Millers Ford Station of the Dayton Power & Light Co., Ohio, has, according to the *Electrical World*, produced yearly savings of about $11,000 per annum during the past seven years, by obviating the need for frequent plug cleaning of tubes and by improved economy in fuel, as a result of higher vacuum. For 1942 the savings were given at $13,965 (fuel $9,888 and labour $4,077), which were obtained for a total cost of $2,901 (chlorine $1,025, capital charges at 13 per cent. $1,751, and maintenance and operation $125).

This station has a capacity of 187,500 kW and includes two 30,000-kW topping turbines fed from boilers with steam conditions of 1,375 lb. per sq. in. and 900 deg. F. The remaining 127,500 kW is made up of six condensing turbines taking steam at 230 lb. per sq. in. and 575 deg. F. which require 220,000 gal. per min. of condenser cooling water from the river. Formerly, slime accumulations were removed by blowing rubber plugs through the condenser tubes and washing with high-pressure water each week in the summer and less frequently during the winter. After cleaning the vacuum was improved by about 0·5in. Hg. The slime consists of inorganic matter that is bound to the surface by filaments of bacterial growth and the latter is now removed by the chlorination.